

MUNICIPALITY OF COLOMBO.

REPORT

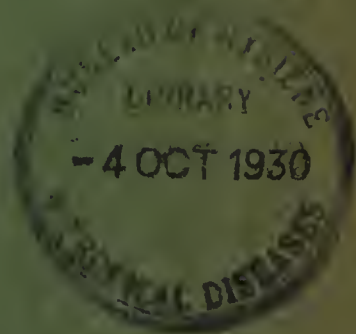
XXIV

OF THE

MEDICAL OFFICER OF HEALTH,

FOR THE YEAR

1929.



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I HAVE the honour to submit the Administration Report of the Public Health Department for the year 1929.

For reasons given in the previous report a number of rates has been omitted as they are likely to be misleading if based upon the 1921 estimate of population which is generally admitted to be too low. Where rates are given it is requested that they be accepted with some reserve.

I have cut down the report to a considerable extent as I find that nothing new can be said every year and the same facts are being paraphrased and reiterated year after year in new phraseology and the report tends to become monotonous and uninteresting. I have instead decided to deal each year with one important problem of public health as fully as possible and then review it again fully after a period of, say, five years when it would be possible to take stock of our position and to register the progress, if any, made during the preceding quinquennium. I have accordingly in this report dealt with the problem of typhoid fever in Colombo as fully as the available statistics and other information permitted. The statistics so far kept on the subject are however not complete, information on several points is not available and a more comprehensive investigation card for each case is desirable in order that more precise information may be available at the next review.

This study has furnished conclusive evidence of the great value of proper drainage and disposal of excreta in the reduction in the incidence of typhoid fever and the urgent call for action in regard to chiefly the Dematagoda and Wall street areas which may, without exaggeration, be termed hotbeds of typhoid fever.

The health of the city on the whole was satisfactory in spite of setbacks in respect of typhoid fever and diarrhœa and enteritis.

The corrected death-rate per 1,000 was 25·1, as against 24·4 in the previous year and 22·7 the lowest death-rate so far recorded which was in 1927. The birth-rate was 32·3, as against 35·8 in the previous year which was also the highest rate so far recorded.

The infantile mortality rate which had been steadily dropping, see Diagram I. C had an unfortunate setback; it being 201 per 1,000 births, as against 181 in the previous year.

The maternal mortality rate per 1,000 births from all causes was 26·3; from puerperal septicæmia 12·0. These rates are still extremely high. The provisions of the Medical Ordinance of 1927 in respect of the registration of midwives come into force as from July 1, 1930, and it is hoped that they will eliminate the dangerous unqualified midwives who are mainly responsible for the high maternal mortality rate from puerperal septicæmia.

Pneumonia and phthisis continue to exact a heavy toll of lives. Bad housing and overcrowding are mainly responsible for their high incidence.

Plague, fortunately, was responsible for only 40 human cases, of which 36 died. The systematic campaign of cleansing and deratting of premises in the cheopis infected areas by the Anti-plague Squad helps to keep this disease well under control.

The staff has worked whole-heartedly and loyally and I am greatly indebted to them for their co-operation.

I am, Sir,

Your obedient Servant,

C. V. ASERAPPA,

M.R.C.S., L.R.C.P., D.P.H., D.T.M. & H.,
Medical Officer of Health.

Town Hall,
Colombo, May 28, 1930.

STATISTICAL SUMMARY.

Mean temperature	...	...	80.1° F.
Rainfall	...	...	90.22 inches,
Average rainfall for the last 22 years	...	...	87.26 inches.
Area within Municipal Council's limits, exclusive of lake	...	...	8,282 acres.
Population by Census of 1921	...	...	244,163
Estimated population as at July 1, 1929	...	...	267,668
Average density per acre	...	...	32.3
Number of live births registered	...	...	8,659
Birth-rate per 1,000 of estimated population	...	...	32.3*
Maternal mortality rate per 1,000 births	...	...	26.3
Number of deaths of infants	...	...	1,738
Infant mortality rate per 1,000 births	...	...	201
Percentage of infant deaths to total mortality	...	...	21.0
Stillbirths	...	...	673
Number of deaths	...	...	8,272
Crude death-rate per 1,000 of estimated population	...	...	30.9*
Corrected death-rate per 1,000 of estimated population	...	...	25.1*
Pneumonia	...	{ No. of deaths ...	1,150
	...	{ Death-rate ...	4.30 per 1,000*
Phthisis	...	{ No. of deaths ...	593
	...	{ Death-rate ...	2.21 per 1,000*
Enteric fever	...	{ No. of deaths ...	184
	...	{ Death-rate ...	0.69 per 1,000*
Plague	...	{ No. of deaths ...	36
	...	{ Death-rate ...	0.13 per 1,000*
Diarrhoea and enteritis	...	{ No. of deaths ...	828
	...	{ Death-rate ...	3.09 per 1,000*
Dysentery	...	{ No. of deaths ...	198
	...	{ Death-rate ...	0.74 per 1,000*

Part I.—Statistics.

I.—METEOROLOGY.

Temperature.—The mean temperature for the year was 80.1°, as against 80.8° for 1928 and 80.1° the average mean for the last 22 years. The minimum temperature was 77.8° in January and the maximum 82.2° in May.

Rainfall.—The total rainfall for the year was 90.22 inches, as compared with 98.81 inches in 1928 and 87.26 the average for the last 22 years. The highest monthly record was 18.66 inches in April and the lowest 0.31 inches in August.

Humidity.—The mean humidity for the year was 80 per cent., as against 80 per cent. for 1928. It ranged from 78 per cent. in February and August to 84 per cent. in November.

II.—POPULATION.

The estimated population of Colombo based on the 1921 Census is 267,668, but this is generally admitted to be abnormally low as the Census of 1921 was taken at a time of trade depression and exodus of population.

An estimate based on the Census of 1911 gives us the figure 351,098, which I should think is nearer the correct figure.

As the two estimates show a considerable difference it has been deemed best to omit giving rates based on such uncertain and probably incorrect figures and to give only the birth- and death-rates which should be regarded as only tentative.

III.—BIRTHS.

8,658 live births were registered during the year representing a birth-rate of 32.3† per 1,000 of estimated population, as against 35.8 in 1928 and 30.3 per 1,000 the average for the previous 10 years.

Stillbirths.—There were 673 stillbirths representing a rate of 72.1 per 1,000 of total births (live and still), as against 693 in 1928. The highest rate, *vide* Table I., was as usual amongst the Tamils.

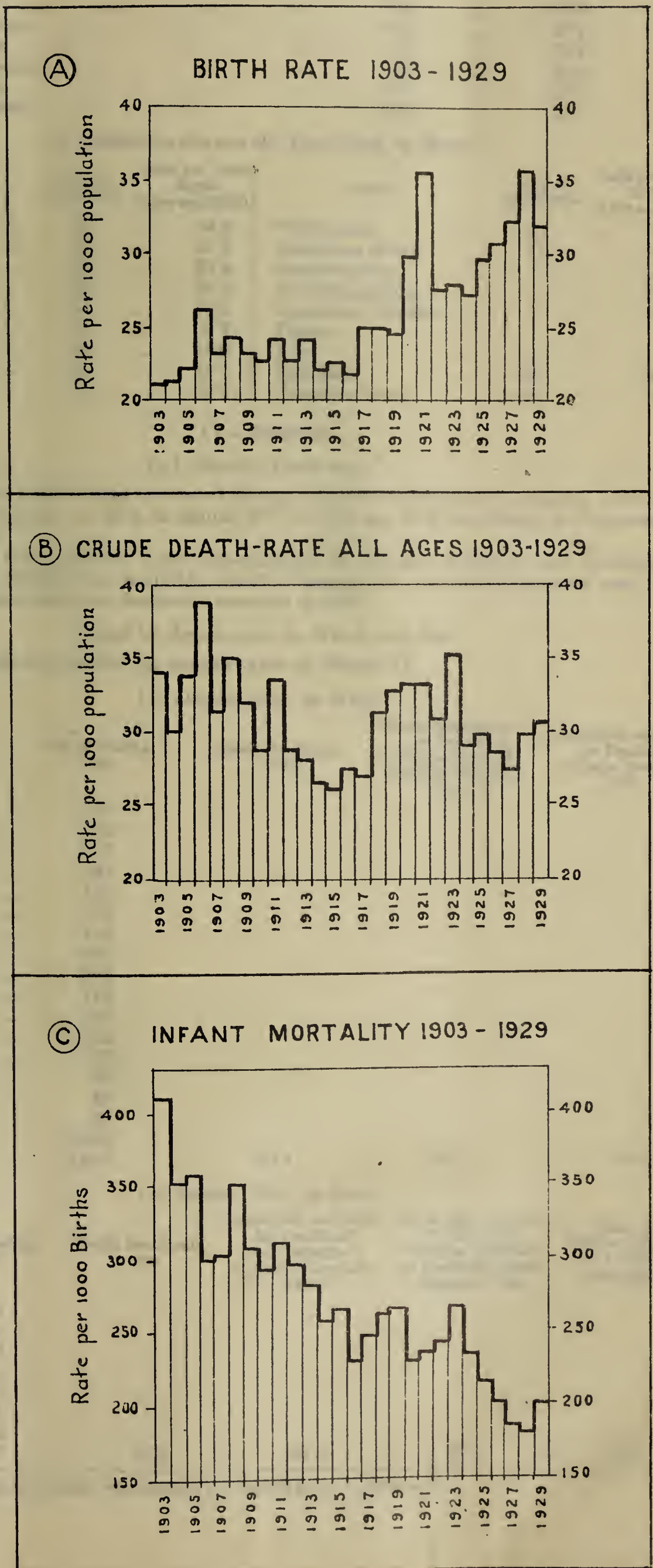
* The birth- and the death-rates given here are only for purposes of comparison with those of previous years, *vide* Section II.

† Rate quoted cannot be accepted as correct, *vide* remarks under section dealing with population.

DIAGRAM No 1

Note

The Birth and Death Rates shown below are only provisional as they are calculated on the estimated population based on the 1921 Census figures which were abnormally low.



The Birth and Death Rates shown below are only provisional as they are calculated on the estimated population base for the 1951 Census figures which were abnormally low.



(1) *Stillbirths in Colombo during the Year 1929, by Race.*

Race.				No. of Stillbirths.		Rate per 1,000 Births (Live and Still).
Sinhalese	...	...	...	437	...	78.7
Tamils	...	...	...	107	...	87.3
Moors	...	...	...	82	...	65.9
Burghers	...	...	...	24	...	39.1
Malays	...	...	...	9	...	28.4
Europeans	...	...	...	3	...	35.3
Others	...	...	...	11	...	56.1
All Races	...	...	...	673	...	72.1

(2) *Stillbirths during the Year 1929, by Ward.*

Ward.	No. of Stillbirths.	Rate per 1,000 Births (Live and Still).	Ward.	No. of Stillbirths.	Rate per 1,000 Births (Live and Still).
Slave Island	35	54.4	Wellawatta	12	36.9
Maradana North	32	57.6	Maradana South	11	38.5
New Bazaar	30	45.4	Bambalapitiya	7	43.8
St. Paul's	29	51.3	Timbirigasyaya	7	27.6
Kotahena	24	40.1	Cinnamon Gardens	6	59.4
Dematagoda	20	39.4	Pettah	—	—
Kollupitiya	19	64.0	Fort	—	—
Mutwal	19	31.4	Hospitals	408	117.1
San Sebastian	14	52.6	Colombo Town	673	72.1

IV.—DEATHS.

(a) *General Death-rate.**

There were 8,272 deaths registered during the year under review, as against 7,989 representing a crude death-rate of 30.9, as against 30.2 in 1928 and 31.2 the average for the preceding ten years 1919–1928.

Excluding the deaths of 1,765 non-residents in Colombo hospitals and including the deaths of Colombo residents in hospitals outside Colombo the corrected death-rate was 25.1, as against 22.7 the lowest corrected death-rate recorded in 1927.

(b) and (c) *Death-rates by Ward and Race.*

These figures are omitted for reasons given in Section II.

(3) *Deaths, 1929, by Ward.*

Ward.	No. of Deaths, 1929.	Crude Death-rate, 1929.	Death-rate corrected for Deaths of Non-residents in Colombo Hospitals, 1929.	Death-rate corrected for Deaths in Colombo Hospitals. 1928.
Mutwal	653			
New Bazaar	592			
St. Paul's	505			
Slave Island	493			
Maradana North	481			
Kotahena	472			
Dematagoda	419			
Maradana South	271			
San Sebastian	258			
Wellawatta	172			
Kollupitiya	165			
Timbirigasyaya	163			
Bambalapitiya	110			
Cinnamon Gardens	72			
Pettah	48			
Fort	20			
Hospitals	3,378			
Colombo Town	8,272	30.9	24.3	23.8

(4) *Deaths, 1929, by Race.*

Race.	No. of Deaths, 1929.	Crude Death-rate, 1929.	Death-rate corrected for Deaths of Non-residents in Colombo Hospitals, 1929.	Death-rate corrected for Deaths of Colombo Residents in Hospitals outside Colombo, 1929.	Death-rate further corrected for Age and Sex Distribution.
Sinhalese	4,674				
Tamils	1,545				
Moors	1,173				
Burghers	346				
Malays	210				
Europeans	51				
Others	273				
All Races	8,272	30.9	24.3	25.1	29.3

* These rates must be taken with caution for reasons given in Section II.

(5) Births and Deaths, and the Infant Mortality, for each Ward of the Town of Colombo during the Year 1929.

WARD.	BIRTHS.							DEATHS.							No. of Infant Deaths.							
	TOTAL BIRTHS.			NATIONALITY.				TOTAL DEATHS.			NATIONALITY.											
	Persons.	Males.	Females.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	Persons.	Males.	Females.	Europeans.		Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	
Colombo Town	8,658	4,403	4,255	81	590	5,114	1,218	1,162	308	185	8,272	4,450	3,822	51	346	4,674	1,545	1,173	210	273	1,738	
Fort	2	—	2	1	—	—	—	1	—	—	20	17	3	2	3	4	3	5	1	2	—	
Pettah	22	8	14	—	—	12	4	1	—	5	48	39	9	1	1	13	16	15	—	2	1	
San Sebastian	252	126	126	—	4	51	28	149	12	8	258	140	118	—	—	57	38	147	6	10	56	
St. Paul's	536	286	250	—	8	101	252	145	4	26	505	270	235	—	7	90	237	142	9	20	149	
Kotahena	574	287	287	1	56	304	148	51	8	6	472	243	229	1	30	232	145	42	10	12	132	
Mutwal	587	301	286	1	30	404	76	51	7	18	653	299	354	1	18	472	97	53	3	9	156	
New Bazaar	631	326	305	—	55	232	59	241	16	28	592	293	299	—	35	189	67	257	14	30	167	
Maradana North	524	283	241	—	44	244	61	133	29	13	481	253	228	—	30	225	69	107	30	20	150	
Maradana South	275	149	126	—	12	153	35	54	15	6	271	129	142	2	10	155	50	37	9	8	55	
Dematagoda	487	233	254	—	40	266	59	80	33	9	419	238	181	3	27	248	53	61	20	7	126	
Slave Island	608	295	313	4	38	198	83	122	134	29	493	257	236	—	14	178	95	109	77	20	118	
Kollupitiya	278	148	130	6	25	147	47	24	16	13	165	84	81	3	15	101	29	14	1	2	34	
Cinnamon Gardens	95	45	50	2	6	40	26	13	6	2	72	44	28	2	2	43	16	5	3	1	14	
Bambalapitiya	153	74	79	2	30	90	20	7	2	2	110	50	60	2	15	65	18	7	1	2	32	
Timbirigasyaya	246	125	121	38	6	164	28	4	3	3	163	79	84	6	8	116	27	5	—	1	55	
Wellawatta	313	145	168	4	37	166	54	42	3	7	172	79	93	1	22	86	33	22	4	4	43	
Hospital (Town residents)	3,075	1,572	1,503	22	199	2,542	238	44	20	10	1,573	917	656	7	79	837	410	120	21	99	2	450
Hospital (Untraced)																						
Hospital (Non-residents)																						

DIAGRAM No 2
COMPARATIVE CHART
SHOWING

THE MORTALITY FROM THE PRINCIPAL DISEASES DURING THE YEAR 1929

A. ALL AGES

BRONCHITIS	ENTERIC FEVER	DYSENTERY	INFANTILE CONVULSIONS UNDER 5 YEARS	INTESTINAL PARASITES	INFLUENZA	CONGENITAL DEBILITY UNDER 1 YEAR	SENILITY	PHTHISIS	DIARRHOEA & ENTERITIS	PNEUMONIA	ALL OTHER CAUSES
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B. INFANTS

BRONCHITIS	CONVULSIONS	PREMATURE BIRTH	PNEUMONIA	DIARRHOEAL DISEASES	ATROPHY & DEBILITY	ALL OTHER CAUSES
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V.—PRINCIPAL CAUSES OF DEATHS.

Pneumonia, as table below shows, was responsible again for the largest number of deaths, namely, 1,150 or 13·8 per cent. of the total deaths registered during the year, as against 1,184 deaths or 14·8 per cent. of total deaths registered during 1928. Next to pneumonia, diarrhœa, enteritis, and dysentery together caused 1,026 deaths, which was an increase over the previous year when deaths from these causes totalled 799 deaths. The tubercular diseases came third with 641 deaths.

(6) *Principal Causes of Deaths during 1929.*

Cause of Death.	No. of Deaths.	
Pneumonia and Broncho-Pneumonia ...	1,150	
Diarrhœa and Enteritis ...	828	} 1,026 Total Diarrhœal
*Dysentery ...	198	
*Pulmonary Tuberculosis ...	593	} 641 Total Tubercular Diseases
Tuberculosis of the Meninges and Central Nervous System ...	7	
Tuberculosis of the Intestines and Peritoneum ...	19	
Tuberculosis of the Vertebral Column ...	3	
Tuberculosis of the Lymphatic System (mesenteric and retroperitoneal glands excepted) ...	3	
Tuberculosis of the Joints ...	3	
Disseminated Tuberculosis ...	5	
Other Tuberculosis ...	8	
Congenital Debility (under one year) ...	555	
Influenza ...	447	
Infantile Convulsions (under five years) ...	252	
*Enteric Fever ...	184	
Malaria ...	133	
Pyrexia ...	51	
*Plague ...	24	

(7) *Certain Minor Causes of Death, 1929.*

Cause of Death.	No. of Deaths.	Cause of Death.	No. of Deaths.
Intestinal Parasites other than Hookworm ...	187	Rabies ...	14
Hookworm ...	177	*Diphtheria ...	7
Paralysis (cause unspecified) ...	144	*Whooping Cough ...	4
Cancer ...	127	*Measles ...	4
Rickets ...	69	Lethargic Encephalitis ...	1
Tetanus ...	57	*Smallpox ...	—
		*Cholera ...	—

(8) *Causes of Deaths registered in Colombo Town during the Year 1929.*

Causes of Death.	Nationality.							
	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
All Causes ...	8,272	51	346	4,674	1,545	1,173	210	273
I.—Epidemic, Endemic, and Infectious Diseases:—								
1.—Epidemic and Endemic Diseases ...	1,098	6	50	529	239	193	27	54
2.—Infectious Diseases—								
a. Tuberculous Diseases ...	641	4	19	391	95	95	15	22
b. Venereal Diseases ...	34	—	—	23	9	2	—	—
c. Other Infectious Diseases ...	58	—	3	35	15	5	—	—
II.—General Diseases not in Class I.								
1. Cancer and Malignant Diseases ...	127	3	11	82	23	1	2	5
2. Other General Diseases not in Class I. ...	229	—	16	141	30	29	11	2
III.—Diseases of the Nervous System and Organs of Special Sense ...	581	4	44	339	87	83	12	12
IV.—Diseases of the Circulatory System ...	256	10	14	139	46	31	9	7
V.—Diseases of the Respiratory System ...	1,393	4	59	784	265	165	33	83
VI.—Diseases of the Digestive System ...	1,423	15	55	849	283	145	28	48
VII.—Non-Venereal Diseases of the Genito-Urinary System and Annexa ...	258	—	9	131	49	56	6	7
VIII.—The Puerperal State ...	228	—	7	141	31	45	4	—
IX.—Diseases of the Skin and of the Cellular Tissue ...	89	1	2	55	24	4	2	1
X.—Diseases of the Bones and of the Organs of Locomotion ...	11	—	1	5	5	—	—	—
XI.—Malformations ...	6	—	—	4	—	1	1	—
XII.—Early Infancy ...	779	—	22	424	152	140	25	16
XIII.—Old Age ...	559	2	20	300	86	116	24	11
XIV.—External Causes ...								
1.—Suicide ...	17	—	1	10	5	—	1	—
2.—Homicide ...	29	—	1	18	7	2	—	1
3.—Judicial Hanging or Execution ...	37	—	—	34	3	—	—	—
4.—Accident and other External Violence ...	190	1	5	113	49	15	4	3
XV.—Ill-defined Diseases ...	229	1	7	127	42	45	6	1

* Notifiable Infectious Diseases.

NOTE.—The deaths that occurred at the Infectious Diseases Hospital, which is beyond Municipal limits, are not included in the above statement.

(8) Causes of Deaths, &c.—contd.

Causes of Death.	Nationality.							
	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
I.—EPIDEMIC, ENDEMIC, AND INFECTIOUS DISEASES.								
1.—Enteric Fever—								
<i>a.</i> Typhoid Fever ...	184	2	12	138	16	5	3	8
<i>b.</i> Paratyphoid Fever ...	—	—	—	—	—	—	—	—
2.—Typhus Fever ...	—	—	—	—	—	—	—	—
3.—Relapsing Fever (<i>spirillum obermeieri</i>) ...	—	—	—	—	—	—	—	—
4.—Malta Fever ...	—	—	—	—	—	—	—	—
5.—Malaria—								
<i>a.</i> Malarial Fever ...	119	1	6	60	30	11	2	9
<i>b.</i> Malarial Cachexia ...	13	1	—	7	4	—	1	—
<i>c.</i> Blackwater Fever ...	—	—	—	—	—	—	—	—
6.—Smallpox—								
<i>a.</i> Vaccinated ...	—	—	—	—	—	—	—	—
<i>b.</i> Unvaccinated ...	—	—	—	—	—	—	—	—
<i>c.</i> Vaccination doubtful ...	—	—	—	—	—	—	—	—
7.—Measles ...	4	—	—	2	—	1	—	1
8.—Scarlet Fever ...	—	—	—	—	—	—	—	—
9.—Whooping Cough ...	4	—	1	1	2	—	—	—
10.—Diphtheria ...	7	—	—	5	—	2	—	—
11.—Influenza—								
<i>a.</i> With pulmonary complications specified ...	96	—	4	31	25	27	2	7
<i>b.</i> Without pulmonary complications specified ...	351	1	10	116	85	108	15	16
12.—Miliary Fever ...	—	—	—	—	—	—	—	—
13.—Mumps ...	1	—	—	1	—	—	—	—
14.—Asiatic Cholera ...	—	—	—	—	—	—	—	—
15.—Cholera Nostras ...	—	—	—	—	—	—	—	—
16.—Dysentery—								
<i>a.</i> Amœbic ...	28	—	2	18	5	2	—	1
<i>b.</i> Bacillary ...	8	—	1	3	4	—	—	—
<i>c.</i> Other or unspecified ...	162	1	6	81	47	19	4	4
17.—Plague—								
<i>a.</i> Bubonic ...	8	—	—	1	1	4	—	2
<i>b.</i> Pneumonic ...	—	—	—	—	—	—	—	—
<i>c.</i> Septicæmic ...	16	—	—	8	6	2	—	—
<i>d.</i> Unspecified ...	—	—	—	—	—	—	—	—
18.—Yellow Fever ...	—	—	—	—	—	—	—	—
19.—Spirochetal Hæmorrhagic Jaundice ...	—	—	—	—	—	—	—	—
20.—Leprosy ...	1	—	—	—	—	1	—	—
21.—Erysipelas ...	4	—	3	1	—	—	—	—
22.—Acute Anterior Poliomyelitis ...	—	—	—	—	—	—	—	—
23.—Lethargic Encephalitis ...	1	—	—	1	—	—	—	—
24.—Meningococcus Meningitis ...	—	—	—	—	—	—	—	—
25.—Other Epidemic and Endemic Diseases—								
<i>a.</i> Chickenpox ...	—	—	—	—	—	—	—	—
<i>b.</i> German Measles ...	—	—	—	—	—	—	—	—
<i>c.</i> Kala-azar ...	1	—	—	—	—	—	—	1
<i>d.</i> Others under this title ...	—	—	—	—	—	—	—	—
26.—Glanders ...	—	—	—	—	—	—	—	—
27.—Anthrax ...	1	—	—	1	—	—	—	—
28.—Rabies (Hydrophobia) ...	14	—	1	9	3	1	—	—
29.—Tetanus—								
(1) Under one year ...	3	—	—	1	2	—	—	—
(2) One year and over ...	54	—	4	32	8	6	—	4
30.—Mycoses—								
<i>a.</i> Thrush ...	17	—	—	11	1	4	—	1
<i>b.</i> Other Mycoses ...	—	—	—	—	—	—	—	—
31.—Tuberculosis of the Respiratory System—								
<i>a.</i> Laryngeal Tuberculosis ...	3	—	1	—	—	—	—	2
<i>b.</i> Pulmonary Tuberculosis ...	593	3	17	362	88	89	15	19
32.—Tuberculosis of the Meninges and Central Nervous System ...	7	1	—	5	—	—	—	1
33.—Tuberculosis of the Intestines and Peritoneum. ...	19	—	1	12	2	4	—	—
34.—Tuberculosis of the Vertebral Column ...	3	—	—	3	—	—	—	—
35.—Tuberculosis of the Joints ...	3	—	—	2	1	—	—	—
36.—Tuberculosis of other Organs—								
<i>a.</i> Tuberculosis of the Skin and Subcutaneous Cellular Tissue ...	—	—	—	—	—	—	—	—
<i>b.</i> Tuberculosis of the Bones (vertebral column excepted) ...	—	—	—	—	—	—	—	—
<i>c.</i> Tuberculosis of the Lymphatic System (mesenteric and retroperitoneal glands excepted) ...	3	—	—	2	1	—	—	—
<i>d.</i> Tuberculosis of the Genito-Urinary System ...	1	—	—	—	—	1	—	—
<i>e.</i> Tuberculosis of Organs other than the above ...	4	—	—	1	2	1	—	—
37.—Disseminated Tuberculosis—								
<i>a.</i> Acute ...	2	—	—	1	1	—	—	—
<i>b.</i> Chronic or unspecified ...	3	—	—	3	—	—	—	—
38.—Syphilis ...	34	—	—	23	9	2	—	—
38 <i>a.</i> —Parangi (Framboesia Tropicum, Yaws) ...	—	—	—	—	—	—	—	—
39.—Soft Chancre ...	—	—	—	—	—	—	—	—
40.—Gonococcus Infection ...	—	—	—	—	—	—	—	—
41.—Purulent Infection, Septicæmia ...	57	—	3	34	15	5	—	—

(8) Causes of Deaths, &c.—contd.

Causes of Death.			Nationality.															
			All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.								
42.—Other Infectious Diseases—																		
<i>a.</i> Vaccinia	—	...	—	...	—	...	—	...	—	...	—				
<i>b.</i> Other diseases under this title	1	...	—	...	—	...	—	...	—	...	—				
II.—GENERAL DISEASES NOT INCLUDED IN CLASS I.																		
43.—Cancer and other Malignant Tumours of the Buccal Cavity	34	...	—	...	1	...	24	...	6	...	—	...	1	...	2
44.—Cancer and other Malignant Tumours of the Stomach, Liver	28	...	1	...	3	...	15	...	8	...	—	...	—	...	1
45.—Cancer and other Malignant Tumours of the Peritoneum, Intestines, Rectum	9	...	1	...	2	...	6	...	—	...	—	...	—	...	—
46.—Cancer and other Malignant Tumours of the Female Genital Organs	21	...	—	...	1	...	16	...	4	...	—	...	—	...	—
47.—Cancer and other Malignant Tumours of the Breast	11	...	—	...	1	...	8	...	1	...	—	...	1	...	—
48.—Cancer and other Malignant Tumours of the Skin	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
49.—Cancer and other Malignant Tumours of other or unspecified Organs	24	...	1	...	3	...	13	...	4	...	1	...	—	...	2
50.—Tumours not returned as Malignant (Brain and Female Genital Organs excepted)	2	...	—	...	—	...	1	...	—	...	—	...	1	...	—
51.—Acute Rheumatic Fever	6	...	—	...	1	...	4	...	—	...	—	...	—	...	1
52.—Chronic Rheumatism, Osteoarthritis, Gout	19	...	—	...	1	...	10	...	5	...	3	...	—	...	—
53.—Scurvy	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
54.—Pellagra	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
55.—Beri-Beri	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
56.—Rickets	69	...	—	...	2	...	37	...	8	...	14	...	7	...	1
57.—Diabetes Mellitus	87	...	—	...	7	...	52	...	13	...	12	...	3	...	—
58.—Anæmia, Chlorosis—																		
<i>a.</i> Pernicious Anæmia	12	...	—	...	2	...	9	...	1	...	—	...	—	...	—
<i>b.</i> Other Anæmias and Chlorosis	9	...	—	...	1	...	6	...	2	...	—	...	—	...	—
59.—Diseases of the Pituitary Gland	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
60.—Diseases of the Thyroid Gland—																		
<i>a.</i> Exophthalmic Goitre	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
<i>b.</i> Other diseases of the Thyroid Gland	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
61.—Diseases of the Parathyroid Glands	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
62.—Diseases of the Thymus Gland	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
63.—Diseases of the Adrenal (Eddison's Disease)	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
64.—Diseases of the Spleen	2	...	—	...	—	...	2	...	—	...	—	...	—	...	—
65.—Leukæmia and Hodgkin's Disease—																		
<i>a.</i> Leukæmia	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
<i>b.</i> Hodgkin's Disease	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
66.—Alcoholism (acute or chronic)	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
67.—Chronic Poisoning by mineral substances—																		
<i>a.</i> Chronic Lead Poisoning	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
<i>b.</i> Others under this title	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
68.—Chronic Poisoning by organic substances	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
69.—Other General Diseases	19	...	—	...	2	...	16	...	1	...	—	...	—	...	—
III.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																		
70.—Encephalitis	4	...	—	...	—	...	3	...	1	...	—	...	—	...	—
71.—Meningitis—																		
<i>a.</i> Simple Meningitis	27	...	1	...	1	...	19	...	3	...	1	...	1	...	1
<i>b.</i> Non-epidemic Cerebro-Spinal Meningitis	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
72.—Tabes Dorsalis (Locomotor Ataxia)	1	...	—	...	—	...	—	...	—	...	—	...	—	...	1
73.—Other Diseases of the Spinal Cord	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
74.—Cerebral Hæmorrhage, Apoplexy—																		
<i>a.</i> Cerebral Hæmorrhage	88	...	2	...	11	...	43	...	13	...	17	...	1	...	1
<i>b.</i> Cerebral Embolism and Thrombosis..			...	16	...	—	...	—	...	12	...	2	...	2	...	—	...	—
75.—Paralysis without specified cause—																		
<i>a.</i> Hemiplegia	54	...	—	...	7	...	23	...	6	...	17	...	—	...	1
<i>b.</i> Other forms of Paralysis	90	...	—	...	7	...	66	...	5	...	10	...	2	...	—
76.—General Paralysis of the Insane	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
77.—Other forms of Insanity	2	...	—	...	—	...	2	...	—	...	—	...	—	...	—
78.—Epilepsy	10	...	—	...	1	...	2	...	5	...	2	...	—	...	—
79.—Convulsions (non-puerperal ; 5 years and over)	27	...	—	...	1	...	18	...	3	...	5	...	—	...	—
80.—Infantile Convulsions (under 5 years of age)	252	...	1	...	15	...	144	...	47	...	29	...	8	...	8
81.—Chorea	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
82.—Neuralgia and Neuritis	1	...	—	...	—	...	1	...	—	...	—	...	—	...	—
83.—Softening of the Brain	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
84.—Other Diseases of the Nervous System	1	...	—	...	—	...	—	...	1	...	—	...	—	...	—
85.—Diseases of the Eye and Annexa	—	...	—	...	—	...	—	...	—	...	—	...	—	...	—
86.—Diseases of the Ear and of the Mastoid Process—																		
<i>a.</i> Diseases of the Ear	3	...	—	...	1	...	1	...	1	...	—	...	—	...	—
<i>b.</i> Diseases of the Mastoid Process	2	...	—	...	—	...	2	...	—	...	—	...	—	...	—
IV.—DISEASES OF THE CIRCULATORY SYSTEM.																		
87.—Pericarditis	8	...	—	...	—	...	5	...	3	...	—	...	—	...	—
88.—Acute Endocarditis and Myocarditis	36	...	4	...	—	...	17	...	7	...	4	...	2	...	2
89.—Angina Pectoris	19	...	2	...	2	...	10	...	3	...	2	...	—	...	—

(8) Causes of Deaths, &c.—contd.

Causes of Death.	Nationality.							
	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
90.—Other Diseases of the Heart—								
<i>a.</i> Valvular Disease ...	77	1	2	42	11	15	3	3
<i>b.</i> Fatty Degeneration of Heart ...	30	1	1	13	9	5	—	1
<i>c.</i> Others under this title ...	45	—	6	26	5	3	4	1
91.—Diseases of the Arteries—								
<i>a.</i> Aneurysm ...	5	2	—	1	2	—	—	—
<i>b.</i> Arteriosclerosis ...	2	—	1	—	1	—	—	—
<i>c.</i> Other Diseases of the Arteries ...	—	—	—	—	—	—	—	—
92.—Embolism and Thrombosis (not Cerebral) ...	21	—	2	16	2	1	—	—
93.—Diseases of the Veins (Varices, Hæmorrhoids, Phlebitis, &c.) ...	6	—	—	4	1	1	—	—
94.—Diseases of the Lymphatic System (Lymphangitis, &c.) ...	2	—	—	2	—	—	—	—
95.—Hæmorrhage without stated cause ...	4	—	—	2	2	—	—	—
96.—Other Diseases of the Circulatory System ...	1	—	—	1	—	—	—	—

V.—DISEASES OF THE RESPIRATORY SYSTEM.

97.—Diseases of the Nasal Fossæ and their Annexa—								
<i>a.</i> Diseases of the Nose ...	2	—	—	2	—	—	—	—
<i>b.</i> Others under this title ...	2	—	—	2	—	—	—	—
98.—Diseases of the Larynx ...	7	—	—	5	2	—	—	—
99.—Bronchitis—								
<i>a.</i> Acute ...	22	—	1	10	3	4	2	2
<i>b.</i> Chronic ...	71	—	4	41	11	9	5	1
<i>c.</i> Unspecified (under 5 years of age) ...	55	1	1	23	12	17	1	—
<i>d.</i> Unspecified (5 years and over) ...	30	1	—	14	5	4	3	3
100.—Broncho-Pneumonia ...	576	1	29	365	90	61	14	16
101.—Pneumonia ...	—	—	—	—	—	—	—	—
<i>a.</i> Lobar ...	261	—	13	114	67	27	—	40
<i>b.</i> Unspecified ...	313	1	6	182	66	34	5	19
102.—Pleurisy—								
<i>a.</i> Empyema ...	12	—	1	9	—	1	—	1
<i>b.</i> Other forms of Pleurisy ...	7	—	—	4	1	2	—	—
103.—Congestion and Hemorrhagic Infarct of the Lung ...	5	—	2	2	1	—	—	—
104.—Gangrene of the Lung ...	5	—	—	4	1	—	—	—
105.—Asthma ...	24	—	2	7	6	5	3	1
106.—Pulmonary Emphysema ...	—	—	—	—	—	—	—	—
107.—Other Diseases of the Respiratory System—								
<i>a.</i> Chronic Interstitial Pneumonia, including Occupational Diseases of the Lungs ...	1	—	—	—	—	1	—	—
<i>b.</i> Diseases of the Mediastinum ...	—	—	—	—	—	—	—	—
<i>c.</i> Others under this title ...	—	—	—	—	—	—	—	—

VI.—DISEASES OF THE DIGESTIVE SYSTEM.

108.—Diseases of the Buccal Cavity and Annexa..	5	—	—	5	—	—	—	—
109.—Diseases of the Pharynx and Tonsils—								
<i>a.</i> Tonsillitis, Adenoid Vegetations ...	1	—	—	—	1	—	—	—
<i>b.</i> Other Diseases under this title ...	2	—	—	1	1	—	—	—
110.—Diseases of the Oesophagus ...	—	—	—	—	—	—	—	—
111.—Ulcer of the Stomach or Duodenum—								
<i>a.</i> Ulcer of the Stomach ...	7	1	1	1	2	2	—	—
<i>b.</i> Ulcer of the Duodenum ...	1	—	—	—	—	1	—	—
112.—Other Diseases of the Stomach ...	10	—	—	6	2	2	—	—
113.—Diarrhœa and Enteritis (under 2 years of age) ...	314	—	24	196	48	31	12	3
114.—Diarrhœa and Enteritis (2 years and over) ..	514	2	14	286	127	60	5	20
115.—Anchylostomiasis ...	177	—	2	118	43	7	3	4
116.—Diseases due to other Intestinal Parasites—								
<i>a.</i> Cestodes (Hydatids of the Liver excepted) ...	—	—	—	—	—	—	—	—
<i>b.</i> Trematodes ...	—	—	—	—	—	—	—	—
<i>c.</i> Nematodes (other than Anchylostoma) ...	6	—	—	4	2	—	—	—
<i>d.</i> Coccidia ...	—	—	—	—	—	—	—	—
<i>e.</i> Other parasites specified ...	—	—	—	—	—	—	—	—
<i>f.</i> Parasites not specified ...	181	—	7	112	24	28	3	7
117.—Appendicitis and Typhlitis ...	13	1	1	8	1	—	—	2
118.—Hernia, Intestinal Obstruction—								
<i>a.</i> Hernia ...	23	—	1	10	2	7	1	2
<i>b.</i> Intestinal Obstruction ...	26	1	1	16	4	2	2	—
119.—Other Diseases of the Intestines—								
<i>a.</i> Psilosis (Sprue or Ceylon Sore-mouth) ...	—	—	—	—	—	—	—	—
<i>b.</i> Others under this title ...	4	1	—	3	—	—	—	—
120.—Acute Yellow Atrophy of the Liver ...	3	1	—	1	1	—	—	—
121.—Hydatid Tumour of the Liver ...	—	—	—	—	—	—	—	—
122.—Cirrhosis of the Liver—								
<i>a.</i> Specified as alcoholic ...	2	—	—	1	1	—	—	—
<i>b.</i> Not specified as alcoholic ...	36	1	2	20	6	2	1	4
123.—Biliary Calculi ...	—	—	—	—	—	—	—	—
124.—Other Diseases of the Liver ...	—	—	—	—	—	—	—	—
<i>a.</i> Abscess of Liver (Amœbiasis) ...	25	2	—	15	6	—	1	1
<i>b.</i> Others under this title ...	9	—	—	4	4	—	—	1

(8) Causes of Deaths, &c.—contd.

Causes of Death.		Nationality.							
		All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
125.—Diseases of the Pancreas ...	...	1	—	—	1	—	—	—	—
126.—Peritonitis without specified cause ...	...	63	5	2	41	8	3	—	4
127.—Other Diseases of the Digestive System ...	...	—	—	—	—	—	—	—	—
VII.—NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ANNEXA.									
128.—Acute Nephritis (including unspecified under 10 years of age) ...	...	55	—	1	29	12	10	2	1
129.—Chronic Nephritis (including unspecified 10 years and over) ...	...	156	—	5	67	30	45	3	6
130.—Chyluria ...	...	—	—	—	—	—	—	—	—
131.—Other Diseases of the Kidneys and Annexa .	...	12	—	1	9	2	—	—	—
132.—Calculi of the Urinary Passages ...	...	—	—	—	—	—	—	—	—
133.—Diseases of the Bladder ...	...	12	—	1	9	1	—	1	—
134.—Diseases of the Urethra, Urinary Abscess, &c.—	...	2	—	—	2	—	—	—	—
<i>a.</i> Stricture of the Urethra ...	...	1	—	—	1	—	—	—	—
<i>b.</i> Others under this title ...	...	5	—	1	3	—	1	—	—
135.—Diseases of the Prostate ...	...	3	—	—	2	1	—	—	—
136.—Non-venereal Diseases of the Male Genital Organs ...	...	—	—	—	—	—	—	—	—
137.—Cysts and other Tumours of the Ovary not returned as malignant ...	...	2	—	—	2	—	—	—	—
138.—Salpingitis and Pelvic Abscess (Female) ...	...	—	—	—	—	—	—	—	—
139.—Tumours of the Uterus not returned as malignant ...	...	3	—	—	2	1	—	—	—
140.—Non-puerperal Uterine Hæmorrhage ...	...	—	—	—	—	—	—	—	—
141.—Other Diseases of the Female Genital Organs ...	...	7	—	—	5	2	—	—	—
142.—Non-puerperal Diseases of the Breast ...	...	—	—	—	—	—	—	—	—
VIII.—THE PUERPERAL STATE.									
143.—Accidents of Pregnancy—	...	1	—	—	1	—	—	—	—
<i>a.</i> Abortion ...	...	3	—	—	3	—	—	—	—
<i>b.</i> Ectopic Gestation ...	...	18	—	2	12	1	3	—	—
<i>c.</i> Other accidents of pregnancy ...	...	23	—	2	15	3	3	—	—
144.—Puerperal Hæmorrhage ...	...	34	—	1	21	4	7	1	—
145.—Other accidents of childbirth ...	...	104	—	2	64	14	22	2	—
146.—Puerperal Septicæmia ...	...	7	—	—	4	—	3	—	—
147.—Puerperal Phlegmasia, Alba Dolens, Embolism, Sudden Death ...	...	18	—	—	14	3	1	—	—
148.—Puerperal Albuminuria and Convulsions—	...	7	—	—	3	2	2	—	—
<i>a.</i> Puerperal Convulsions ...	...	13	—	—	4	4	4	1	—
<i>b.</i> Puerperal Albuminuria ...	...	—	—	—	—	—	—	—	—
149.—Childbirth not assignable to other headings (Puerperal Insanity) ...	...	—	—	—	—	—	—	—	—
150.—Puerperal Diseases of the Breast ...	...	—	—	—	—	—	—	—	—
IX.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.									
151.—Gangrene ...	...	35	—	—	26	6	2	1	—
152.—Carbuncle, Boil ...	...	3	—	—	1	1	—	—	1
153.—Acute Abscess—	...	15	—	1	12	2	—	—	—
<i>a.</i> Cellulitis ...	...	14	1	—	6	5	2	—	—
<i>b.</i> Acute abscess ...	...	10	—	—	5	5	—	—	—
154.—Other Diseases of the Skin and Annexa—	...	—	—	—	—	—	—	—	—
<i>a.</i> Ulcer, Bedsore ...	...	12	—	1	5	5	—	1	—
<i>b.</i> Elephantiasis Arabum ...	...	—	—	—	—	—	—	—	—
<i>c.</i> Other Diseases under this title ...	...	—	—	—	—	—	—	—	—
X.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.									
155.—Diseases of the Bones (Tuberculosis and Mastoid Diseases excepted) ...	...	7	—	1	2	4	—	—	—
156.—Diseases of the Joints (Tuberculosis and Rheumatism excepted) ...	...	4	—	—	3	1	—	—	—
157.—Amputations ...	...	—	—	—	—	—	—	—	—
158.—Other Diseases of the Organs of Locomotion ...	...	—	—	—	—	—	—	—	—
XI.—MALFORMATIONS.									
159.—Congenital Malformations (stillbirths excluded)—	...	1	—	—	—	—	1	—	—
<i>a.</i> Congenital Hydrocephalus ...	...	2	—	—	2	—	—	—	—
<i>b.</i> Congenital Malformations of the Heart ...	...	—	—	—	—	—	—	—	—
<i>c.</i> Others under this title ...	...	3	—	—	2	—	—	1	—
XII.—EARLY INFANCY.									
160.—Congenital Debility, Icterus, and Sclerema ...	...	553	—	15	258	116	130	21	13
161.—Premature Birth : Injury at Birth—	...	211	—	6	157	33	9	4	2
<i>a.</i> Premature Birth ...	...	2	—	—	1	—	1	—	—
<i>b.</i> Injury at Birth ...	...	—	—	—	—	—	—	—	—

(8) Causes of Deaths, &c.—contd.

Causes of Death.	Nationality.												
	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.					
162.—Other Diseases peculiar to Early Infancy ...	13	—	1	8	3	—	—	1					
163.—Lack of Care ...	—	—	—	—	—	—	—	—					
XIII.—OLD AGE.													
164.—Senility ...	559	2	20	300	86	116	24	11					
XIV.—EXTERNAL CAUSES.													
165.—Suicide by Solid or Liquid Poisons (Corrosive substances excepted) ..	—	—	—	—	—	—	—	—					
166.—Suicide by Corrosive substances	2	—	1	1	—	—	—	—					
167.—Suicide by Poisonous Gas ...	—	—	—	—	—	—	—	—					
168.—Suicide by Hanging or Strangulation	7	—	—	5	2	—	—	—					
169.—Suicide by Drowning ...	3	—	—	1	1	—	1	—					
170.—Suicide by Firearms	1	—	—	1	—	—	—	—					
171.—Suicide by Cutting or Piercing Instrument	2	—	—	1	1	—	—	—					
172.—Suicide by Jumping from high places	—	—	—	—	—	—	—	—					
173.—Suicide by Crushing	—	—	—	—	—	—	—	—					
174.—Suicide by other means	2	—	—	1	1	—	—	—					
175.—Poisoning by Food	4	—	—	4	—	—	—	—					
176.—Poisoning by Venomous Bites and Stings—													
<i>a.</i> Snake-bite	—	—	—	—	—	—	—	—					
<i>b.</i> Insect Stings	—	—	—	—	—	—	—	—					
<i>c.</i> Other Venomous Poisonings	3	—	—	3	—	—	—	—					
177.—Other Acute Accidental Poisonings	1	—	—	1	—	—	—	—					
178.—Conflagration	6	—	—	3	—	2	1	—					
179.—Accidental Burns (Conflagration excepted),	17	—	—	14	2	1	—	—					
180.—Accidental Mechanical Suffocation	—	—	—	—	—	—	—	—					
181.—Accidental Absorption of Irrespirable, Irritating, or Poisonous Gas	—	—	—	—	—	—	—	—					
182.—Accidental Drowning	20	—	1	9	6	2	2	—					
183.—Accidental Traumatism by Firearms (wounds of war excepted)	7	—	—	6	—	1	—	—					
184.—Accidental Traumatism by Cutting or Piercing Instruments	2	—	—	1	1	—	—	—					
185.—Accidental Traumatism by Falls—													
<i>a.</i> From Trees	10	—	—	6	3	—	—	1					
<i>b.</i> From Heights other than trees	4	—	1	3	—	—	—	—					
<i>c.</i> Traumatism by other Accidental Falls	15	1	1	7	4	2	—	—					
186.—Accidental Traumatism in Mines and Quarries	—	—	—	—	—	—	—	—					
187.—Accidental Traumatism by Machines	1	—	—	—	1	—	—	—					
188.—Accidental Traumatism by other Crushing—													
<i>a.</i> Cart or Carriage	7	—	—	3	4	—	—	—					
<i>b.</i> Landslides	—	—	—	—	—	—	—	—					
<i>c.</i> Motor Vehicles	42	—	2	21	14	4	—	1					
<i>d.</i> Railways	17	—	—	11	5	—	1	—					
<i>e.</i> Others under this title	15	—	—	9	5	1	—	—					
189.—Injuries by Animals (poisoning by venomous bites and stings excepted)	2	—	—	1	1	—	—	—					
190.—Wounds of War	—	—	—	—	—	—	—	—					
191.—Execution of Civilians by Belligerent Armies	—	—	—	—	—	—	—	—					
192.—Starvation (Hunger or Thirst)	5	—	—	2	2	—	—	1					
193.—Excessive Cold	—	—	—	—	—	—	—	—					
194.—Excessive Heat	—	—	—	—	—	—	—	—					
195.—Lightning	—	—	—	—	—	—	—	—					
196.—Electricity (Lightning excepted)	—	—	—	—	—	—	—	—					
197.—Homicide by Firearms	1	—	—	1	—	—	—	—					
198.—Homicide by Cutting or Piercing Instruments	13	—	1	9	2	1	—	—					
199.—Homicide by other means	15	—	—	8	5	1	—	1					
200.—Infanticide (murder of infant less than 1 year of age)	—	—	—	—	—	—	—	—					
201.—Fractures (cause not specified)	3	—	—	2	—	1	—	—					
202.—Other External Violence—													
<i>a.</i> Judicial Execution	37	—	—	34	3	—	—	—					
<i>b.</i> Others under this title	9	—	—	7	1	1	—	—					
203.—Violent deaths of unknown causation	—	—	—	—	—	—	—	—					
XV.—ILL-DEFINED DISEASES.													
204.—Sudden death	—	—	—	—	—	—	—	—					
205.—Cause of death not specified or ill-defined—													
<i>a.</i> Dropsy	2	—	—	1	1	—	—	—					
<i>b.</i> Heart Failure	18	—	—	14	1	3	—	—					
<i>c.</i> Pyrexia	51	1	1	32	11	5	1	—					
<i>d.</i> Other Ill-defined diseases	158	—	6	80	29	37	5	1					
<i>e.</i> Not specified unknown	—	—	—	—	—	—	—	—					

VI.—INFANT MORTALITY.

The year under review showed a slight setback there being 1,738 deaths, as against 1,714 in the previous year, representing an infant mortality rate of 201 per 1,000 births, as against 181 in 1928. The principal causes of death were atrophy and debility, diarrhoeal diseases, and pneumonia.

(9) *Births and Infantile Deaths and the Infant Mortality Rates for Colombo Town, 1920 to 1929.*

Year.	No. of Births.	No. of Infant Deaths.	Infant Mortality Rate per 1,000 Births.
1920	7,197	1,679	233
1921	8,724	2,098	240
1922	6,881	1,702	247
1923	7,107	1,929	271
1924	6,887	1,643	239
1925	7,663	1,689	220
1926	8,114	1,658	204
1927	8,491	1,584	187
1928	9,486	1,714	181
1929	8,659	1,738	201

(10) *Principal Causes of Infant Mortality in 1929.*

Expressed as a percentage of Total Infant Deaths.

Cause of Death.	No. of Deaths.	Percentage.
Convulsions ...	185	10·6
Atrophy and Debility	553	31·8
Diarrhoeal Diseases	224	12·9
Pneumonia ...	222	12·8
Premature Birth	211	12·1

(11) *Infant Mortality by Race, 1929—Number of Infant Deaths and Rate per 1,000 Births.*

Race.	No. of Infant Deaths, 1929.	Rate per 1,000 Births, 1929.	Rate per 1,000 Births, Previous Year.	Increase or Decrease of 1929 Rate when compared with 1928 Rate.
All Races	1,738	201	181	+26
Europeans	2	24	22	+ 2
Burghers	80	136	122	+14
Sinhalese	971	190	175	+15
Tamils	308	253	218	+35
Moors	280	241	205	+36
Malays	56	182	164	+18
Others	41	222	206	+16

(12) *Infant Mortality, 1929, by Wards—Rate per 1,000 Births.*

Ward.	Average 1919 to 1928.	1928.	1929.	Increase or Decrease of 1929 rate when compared with that of 1928.
Colombo Town	229	181	201	+ 20
Fort	117	—	—	—
Pettah	308	233	45	—188
San Sebastian	317	206	222	+ 16
St. Paul's	371	219	278	+ 59
Kotahena	261	239	230	— 9
Mutwal		225	266	+ 41
New Bazaar	330	233	265	+ 32
Maradana North	263	236	286	+ 50
Maradana South		239	200	— 39
Dematagoda		197	259	+ 62
Slave Island	266	235	194	— 41
Kollupitiya	197	120	122	+ 2
Cinnamon Gardens		152	145	— 7
Bambalapitiya	183	104	209	+105
Timbirigasyaya		143	223	+ 80
Wellawatta		117	137	+ 20
Hospitals	156	130	146	+ 16

(13) *Infant Mortality by Race, during the Year 1929—Rate per 1,000 Births.*

Cause.	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
All Causes	201	24	136	190	253	241	182	222
Premature Birth	24	—	10	31	27	8	13	11
Atrophy and Debility	64	—	25	51	95	112	68	70
Bronchitis	5	12	2	5	7	6	7	5
Pneumonia	26	—	22	28	25	19	16	33
Diarrhoeal Diseases	26	—	33	27	29	18	26	16
Convulsions	21	12	19	20	29	19	19	27
Tetanus	0·3	—	—	0·2	2	—	—	—
All other causes	34	—	25	27	39	59	33	60

(14) Causes of Infant Mortality, 1920 to 1929—Number of Deaths.

Cause of Infant Deaths.	1920	1921	1922	1923	1924	Average, 1920-1924	1925	1926	1927	1928	1929
Developmental Diseases ...	498	706	603	685	617	622	602	609	676	820	765
Pneumonia and Bronchitis ...	228	311	251	263	213	253	241	228	254	257	268
Digestive Diseases ...	220	279	225	262	235	244	220	226	202	194	242
Convulsions ...	590	602	411	480	409	498	426	420	256	208	184
Tetanus Neonatorum...	17	16	17	7	22	16	13	18	9	12	3
Tuberculosis ...	6	19	9	10	4	10	2	—	1	—	—
Infectious Diseases ...	6	7	2	6	1	4	3	3	2	2	3
Syphilis ...	33	33	44	59	36	41	37	34	29	31	23

(15) Causes of Infant Mortality, 1920 to 1929—Rate per 1,000 Births.

Cause of Infant Deaths.	1920	1921	1922	1923	1924	Average, 1920-1924	1925	1926	1927	1928	1929
Developmental Diseases ...	69	81	88	96	90	85	78	75	80	86	88
Pneumonia and Bronchitis ...	32	36	36	37	31	34	31	28	30	27	31
Digestive Diseases ...	31	32	33	37	34	33	29	28	24	20	28
Convulsions ...	82	69	60	68	59	68	56	52	30	22	21
Tetanus Neonatorum ...	2	2	2	1	3	2	2	2.2	1.1	1	0.3
Tuberculosis ...	1	2	1	1	0.6	1.1	0.3	—	0.1	—	—
Infectious Diseases ...	1	1	0.6	1	0.1	0.7	0.4	0.4	0.2	0.2	0.3
Syphilis ...	5	4	6	8	5	6	5	4	3.2	3.3	3

(16) Infant Mortality—Deaths at different Age Periods and from Several Causes.

Causes of Death.	Age.												Race.								
	Age in Weeks.					Age in Months.							Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	All Races.	
	1	2	3	4	Total.	2	3	4	5	6	7-9	10-12									Total.
I.—Developmental Diseases:—																					
1. Premature birth ...	173	22	5	7	207	1	—	1	—	1	1	—	4	—	6	157	33	9	4	2	211
2. Atelectasis ...	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
3. Atrophy and Debility ...	236	43	37	33	349	66	38	27	21	13	30	9	204	—	15	258	116	130	21	13	553
4. Others ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
II.—Diseases of Respiratory System:—																					
1. Laryngitis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Croup ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Bronchitis ...	1	2	2	4	9	5	3	6	6	3	9	5	37	1	1	26	8	7	2	1	46
4. Pneumonia ...	—	1	2	5	8	18	22	20	21	17	66	50	214	—	13	145	31	22	5	6	222
5. Others ...	—	—	—	—	—	—	—	—	—	—	1	1	2	—	—	—	2	—	—	—	2
III.—Diseases of Digestive System:—																					
1. Diarrhoeal ...	4	3	5	18	30	33	33	20	17	18	48	27	196	—	19	140	35	21	8	3	226
2. Dentition ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Others ...	2	—	1	2	5	1	2	1	1	1	3	2	11	—	3	10	1	1	1	—	16
IV.—Diseases of Nervous System:—																					
1. Convulsions ...	33	10	8	9	60	24	19	18	13	8	25	17	124	1	11	104	35	22	6	5	184
2. Laryngismus stridulus ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Tetanus ...	1	—	—	—	1	—	—	—	—	—	1	1	2	—	—	1	2	—	—	—	3
4. Others ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
V.—Tuberculous Diseases:—																					
1. Tabes messenterica ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Tubercular meningitis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Others ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VI.—Accidents:—																					
1. Injury ...	2	—	—	—	2	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	2
2. Umbilical hæmorrhage ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Suffocation ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Other violence ...	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
VII.—Infectious Diseases:—																					
1. Smallpox ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Chickenpox ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Measles ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Whooping cough ...	—	—	—	—	—	—	1	—	—	—	1	1	3	—	—	1	2	—	—	—	3
5. Mumps ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Diphtheria ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7. Cerebro-spinal fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Scarlet fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VIII.—Syphilis ...	—	—	2	2	4	6	4	2	4	2	1	—	19	—	—	16	6	1	—	—	23
IX.—All other causes ...	22	9	10	7	48	38	20	14	20	19	53	33	197	—	12	110	37	66	9	11	245
Total ...	476	90	72	87	725	192	142	109	103	82	239	146	1013	2	80	971	308	280	56	41	1738
Percentage on Total Infant Deaths ..	27.4	5.2	4.1	5.0	41.7	11.0	8.2	6.3	5.9	4.7	13.8	8.4	58.3	.1	4.6	55.9	17.7	16.1	3.2	2.4	—

PLAGUE 1929 IN THE CITY OF COLOMBO

— Scale 50 Chains to an Inch —

Published under the orders of A. H. G. Dawson Surveyor General, Ceylon.

Human Cases...
Rat.....



GOLOMBO
CITY
OF
SRI LANKA



VII.—INFECTIOUS DISEASES (GENERAL.)

The writer suggested to Council that pneumonia, dysentery (amœbic and bacillary), and whooping cough should be made notifiable diseases in Colombo town as it would help the Health Department to study the incidence of these diseases better and take such preventive measures as were considered necessary, but the Council only approved of dysentery and whooping cough being made notifiable, and these were added to the list of notifiable diseases on January 1, 1929.

Plague showed no increase over the previous year. Enteric fever showed an increase of 71 cases, diphtheria of 13 cases, and measles of 219 cases over the previous year. Chickenpox showed a slight improvement over last year, but was responsible for 1,288 cases the great majority of which were due to contact infection in the crowded chumneries situated in the congested areas of the town.

(17) *Infectious Diseases Recorded (Town Cases), 1920 to 1929.*

Diseases.	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
Plague ...	235	184	136	230	148	64	13	83	40	40
Cholera ...	—	—	—	—	1	3	—	—	1	1
Smallpox ...	75	12	34	3	4	1	10	2	10	2
Chickenpox ...	639	711	699	1,235	790	1,703	1,045	887	1,520	1,288
Measles ...	1,062	190	226	761	650	627	518	102	612	831
Diphtheria ...	7	20	16	19	11	14	17	18	20	33
Enteric Fever ...	677	398	341	535	415	473	249	206	230	301
Continued Fever ...	162	187	115	105	231	243	168	136	127	132
Phthisis ...	1,361	1,367	1,181	1,343	1,146	1,146	977	810	910	902
Dysentery ...	...	...	Not notifiable during these years						...	435
Whooping Cough ...	...	...	Not notifiable during these years						...	59

(18) *Notifiable Infectious Diseases, 1929.*

Diseases.	(a) TOWN CASES.												(b)	(c)	(d)	(e)	(f)
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total Town Cases.	Port Cases	Outside Cases.	Grand Total, 1929.	Total Town Cases, 1929.
Plague ...	9	5	5	7	4	2	—	1	—	3	1	3	40	—	—	40	40
Cholera ...	1	—	—	—	—	—	—	—	—	—	—	—	1	2	—	3	1
Smallpox ...	—	1	—	—	—	—	—	—	—	—	—	1	2	1	—	3	10
Chickenpox ...	63	178	146	204	116	84	94	93	82	102	93	33	1,288	6	93	1,387	1,520
Measles ...	234	132	166	104	33	29	52	41	18	7	6	9	831	1	56	888	612
Diphtheria ...	3	1	3	3	9	3	1	4	—	2	3	1	33	1	14	48	20
Acute Diarrhœa ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
Enteric Fever ...	15	11	16	31	26	13	21	35	35	42	31	25	301	8	331	640	230
Continued Fever ...	11	12	10	9	14	8	10	14	12	13	9	10	132	—	98	230	127
Phthisis ...	81	58	58	74	90	69	71	90	92	96	73	50	902	7	404	1,313	910
Scarlet Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	3	—
Typhus Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dysentery ...	18	32	21	23	29	47	41	62	50	36	33	43	435	7	156	598	*
Whooping Cough ...	8	5	6	3	6	4	4	5	8	6	1	3	59	—	17	76	*

VIII.—PLAGUE.

Human Plague.—There were 40 cases of human plague during 1929 with 36 deaths, representing a case mortality of 90, as against the same number in 1928 with 37 deaths and a case mortality of 92·5.

Of the 40 cases, 15 were septicæmic in type, all of which ended fatally, and 25 were bubonic, representing a case mortality of 84 per cent. Four of the bubonic cases recovered. The case mortality per cent. was 90, as against the average of 93·0 for the period 1919–1928.

Monthly Incidence.—The largest number of cases occurred during the first four months of the year, the incidence being as follows :—

January ...	...	9	July ...	...	—
February ...	...	5	August ...	...	1
March ...	...	5	September ...	...	—
April ...	...	7	October ...	...	3
May ...	...	4	November ...	...	1
June ...	...	2	December ...	...	3

Rat Plague.—24,609 rats, as against 22,660 in 1928, were examined at the Laboratory and 22 or 0·09 per cent. were found infected as against 0·08 in 1928.

The ward—namely, Pettah—which had the highest number of human cases also had the highest number of rat plague cases. See Statements (19) and (23). No infected rats were found or reported from the Customs premises, warehouses, or granaries.

* Dysentery and Whooping Cough were added to the list of Notifiable Diseases on January 1, 1929.

Rat Destruction.

No. of rats trapped in the city	...	...	124,512
No. of rats trapped in Chalmers granaries	...	...	2,556
No. of rats trapped in Manning market	...	...	902
			<hr/>
			127,970
No. of rats killed by fumigators	...	...	1,949
No. of rats found dead	...	...	141
No. of rats found mummified	...	...	15
			<hr/>
Total	...	...	130,075

Preventive Measures.—The usual preventive measures were carried out special attention being paid to the endemic areas.

Statement (25) shows the work done by the Anti-Plague Squad during the year.

(19) *Human Plague, 1929.**Distribution by Wards.*

Ward.	No. of Cases.	No. of Deaths.	Ward.	No. of Cases.	No. of Deaths.
Fort	...	—	Kollupitiya	...	1
Pettah	...	12	Cinnamon Gardens	...	—
San Sebastian	...	1	Bambalapitiya	...	—
St. Paul's	...	7	Timbirigasyaya	...	—
Kotahena	...	2	Wellawatta	...	—
Mutwal	...	7	No fixed residence	...	1
New Bazaar	...	2	Untraced...	...	1
Maradana North	...	1			
Maradana South	...	1	Total	...	40
Dematagoda	...	1			
Slave Island	...	3			36

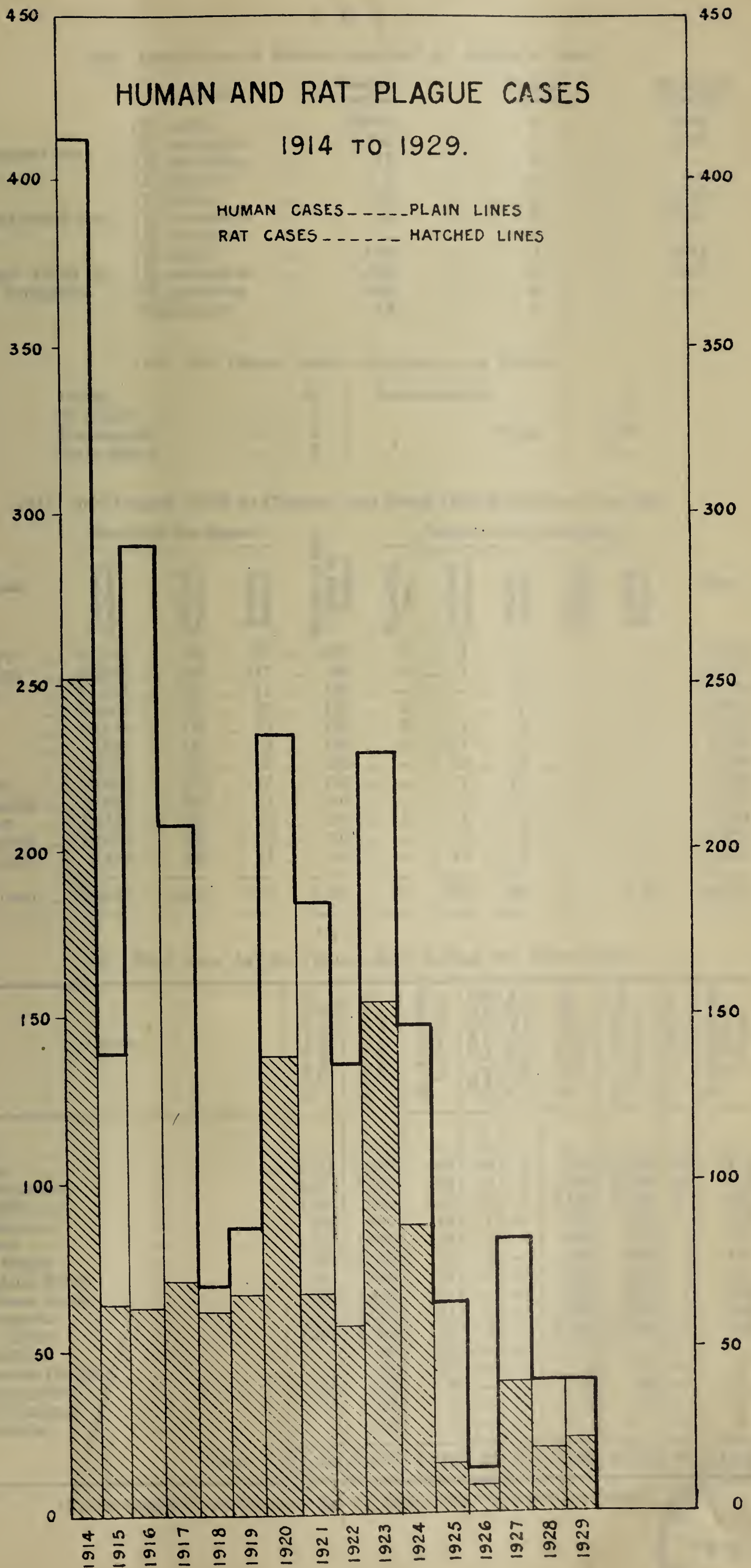
(20) *Human Plague in Colombo during the Year 1929—Distribution by Race, Sex, and Age.*

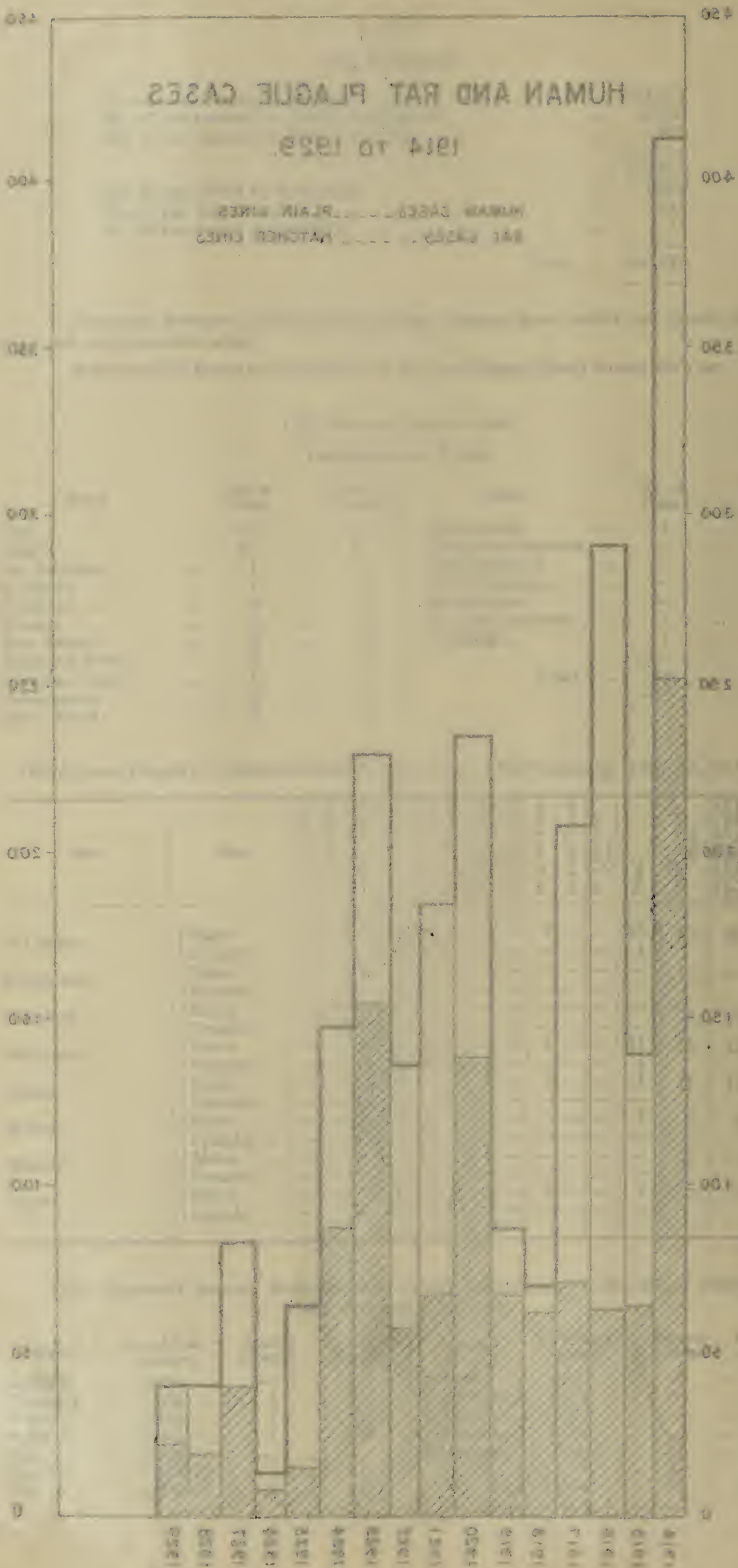
Race.	Sex.	0 to 5 Years.	5 to 10 Years.	10 to 15 Years.	15 to 20 Years.	20 to 25 Years.	25 to 30 Years.	30 to 35 Years.	35 to 40 Years.	40 to 50 Years.	50 to 60 Years.	60 Years and Over.	Total.	Total of each Race.	No. of Deaths (inclusive of Deaths of Colombo cases at I. D. H.)	Case Mortality per Cent.
All Races	{ Males	...	...	6	11	4	6	2	—	7	—	—	36	40	36	90
	{ Females	...	...	—	1	3	—	—	—	—	—	—	4	—	—	—
Europeans	{ Males	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
	{ Females	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
Burghers	{ Males	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
	{ Females	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
Sinhalese	{ Males	...	...	2	5	3	—	—	—	1	—	—	11	15	13	86·7
	{ Females	...	...	—	1	3	—	—	—	—	—	—	4	—	—	—
Tamils	{ Males	...	...	3	2	—	2	2	—	2	—	—	11	11	10	90·9
	{ Females	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
Moors	{ Males	...	...	—	3	1	1	—	—	2	—	—	7	7	6	85·7
	{ Females	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
Malays	{ Males	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
	{ Females	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—
Others	{ Males	...	...	1	1	—	3	—	—	2	—	—	7	7	7	100
	{ Females	...	...	—	—	—	—	—	—	—	—	—	—	—	—	—

(21) *Statement showing Rats examined at the Laboratory, Number found infected, and Percentage Infection.*

Month.	No. of Rats examined.	Number infected.	Percentage infection.	Month.	No. of Rats examined.	Number infected.	Percentage infection.
January	...	1,966	...	August	...	2,441	...
February	...	1,854	...	September	...	2,365	...
March	...	1,445	...	October	...	1,984	...
April	...	2,043	...	November	...	2,356	...
May	...	2,068	...	December	...	1,847	...
June	...	1,938	...				
July	...	2,302	...	Total	...	24,609	...

DIAGRAM Nº 3.





(22) *Distribution of Rodents examined for Plague in 1929.*

		Species.	Number examined.	Number infected.	Percentage infected.
Trapped rats	...	R. rattus	16,809	3	0.02
		R. norvegicus	4,286	1	0.02
		M. musculus	712	0	—
		Bandicoots	5	0	—
Rats found dead...		R. rattus	46	2	4.35
		R. norvegicus	68	7	10.29
		M. musculus	1	0	—
Rats killed by fumigation	...	R. rattus	698	1	0.14
		R. norvegicus	1,363	8	0.59
		M. musculus	608	0	—
		Bandicoots	13	0	—

(23) *Rat Plague, 1929.—Distribution by Wards.*

Pettah	...	10	Bambalapitiya	...	2
St. Paul's	...	5			
Dematagoda	...	1	Total	...	22
Slave Island	...	4			

(24) *Rats trapped, killed by Claytons, and found Dead during the Year 1929.*

Month.	Number of Rats trapped.			Number of Rats killed by Claytons.	Number of Rats found Dead.					Total.
	Veterinary Department.	Chalmers Granaries.*	Manning Market.*		Mummified Rats.	Veterinary Department.	Plague Inspector.	Chalmers Granaries.*	Manning Market.*	
January	12,167	244	89	105	2	4	6	—	—	12,617
February	10,005	307	112	88	—	3	3	—	—	10,518
March	11,301	179	74	162	—	—	3	—	1	11,720
April	10,408	165	87	168	6	—	7	—	—	10,841
May	10,154	178	73	153	2	4	2	—	—	10,566
June	9,081	145	63	186	4	17	4	—	—	9,500
July	9,182	216	81	206	—	13	2	—	—	9,700
August	10,802	272	75	192	—	7	10	—	—	11,358
September	10,887	232	51	207	—	9	8	—	—	11,394
October	10,165	189	70	156	1	1	2	—	—	10,584
November	10,865	203	56	191	—	7	6	—	—	11,328
December	9,495	226	71	135	—	19	3	—	—	9,949
Total	124,512	2,556	902	1,949	15	84	56	—	1	130,075

(25) *Work done by the Plague Staff during the Year 1929.*

WARD.			No. of Dwellings Claytonized.	No. of Rat Holes Claytonized.	No. of Rats killed by Claytons.	No. of Recently Dead Rats found.	No. of Mummified Rats found.	No. of Dwellings Pesterined.	No. of Dwellings Disinfected.	No. of Rat Nests found.	No. of Cart Loads of Rubbish removed.
Fort	...	...	—	—	—	—	—	—	—	—	—
Pettah	...	...	2,814	3,682	289	22	7	591	2,208	14	311 $\frac{1}{4}$
San Sebastian	...	...	1,812	1,386	99	2	2	600	1,234	16	81 $\frac{1}{4}$
St. Paul's	...	...	5,190	3,592	386	16	4	2,485	2,782	11	360 $\frac{1}{4}$
Kotahena	...	...	658	820	74	1	—	352	287	—	28 $\frac{1}{4}$
Mutwal	...	...	1,496	1,890	239	4	1	863	572	3	90
New Bazaar	...	...	891	1,832	79	3	—	458	292	9	43
Maradana North	...	...	377	930	74	1	1	212	162	4	46
Maradana South	...	...	880	1,440	381	—	—	500	395	7	50 $\frac{1}{2}$
Dematagoda	...	...	718	1,064	84	3	—	321	222	6	50 $\frac{1}{2}$
Slave Island	...	...	2,266	2,306	186	4	—	1,041	1,183	18	120 $\frac{1}{4}$
Kollupitiya	...	...	4	30	13	—	—	—	—	—	1
Cinnamon Gardens	...	...	24	98	27	—	—	6	9	—	1
Bambalapitiya	...	...	43	168	9	—	—	13	18	—	1
Timbirigasyaya	...	...	17	53	8	—	—	8	7	—	2
Wellawatta	...	...	9	12	1	—	—	—	—	—	4
Total	...	...	17,199	19,303	1,949	56	15	7,450	9,371	88	1,190 $\frac{1}{4}$

* Figures supplied by the Chairman, Board of Immigration and Quarantine, Colombo.

IX.—CHOLERA.

One case was reported from the town in the person of an Indian passenger from South India and two cases from the Port. There were no deaths.

X.—SMALLPOX AND VACCINATION.

There were two cases of smallpox in the town and one from the Port. Both the town cases were in the persons of recent arrivals from South India. One was a child 4 months old and unvaccinated. It had a confluent attack but recovered. The other was an adult who had been vaccinated during the incubation period at the Quarantine Camp at Mandapam but developed a mild form of the disease in Colombo.

Vaccination.—The Government Medical Department is responsible for all vaccinations in the Island including vaccinations in the city. The Public Health Department of the Colombo Municipality has no vaccinator on its staff and when any cases of smallpox occur in the city the Department carries out vaccinations and revaccinations in the affected area with the help of a few officers of the outdoor staff who are drawn off their own work. This is not a satisfactory arrangement, and in the opinion of the writer vaccination in the city should be done by the Public Health Department.

(26) *Births and Primary Vaccinations.*

Year.	No. of Births.	Number of Vaccinations performed by Government Vaccinators and Officers of the Public Health Department.		Deficit.
1923	7,107	...	6,192	915
1924	6,887	...	5,784	1,103
1925	7,663	...	5,704	1,959
1926	8,114	...	5,623	2,491
1927	8,491	...	4,545	3,946
1928	9,486	...	4,521	4,965
1929	8,658	...	7,398	1,260

(27) *Vaccinations performed during the Year 1929.*(a) *By Government Vaccinators.*

(Figures supplied by the Provincial Surgeon, Western Province.)

Station.	Number of Primary Vaccinations.		Number of Re-vaccinations.		Total.
Timbirigasyaya and Dematagoda	...	1,278	...	24	1,302
Bambalapitiya	...	772	...	284	1,056
Layard's Broadway	...	923	...	—	923
Maradana	...	851	...	45	896
Kotahena and Alutmawatta	...	859	...	—	859
San Sebastian street	...	770	...	23	793
Silversmith street	...	770	...	—	770
Slave Island	...	698	...	46	744
Itinerating	...	422	...	—	422
Total	...	7,343	...	422	7,765

(b) *By the Public Health Department.*

Ward.	Number of Primary Vaccinations.		Number of Re-vaccinations.		Total.
Slave Island	...	55	...	467	522
Fort	...	—	...	14	14
Total	...	55	...	481	536

(c) *Total Vaccinations in Colombo.*

Primary vaccinations	...	...	...	7,398
Re-vaccination	...	...	...	903
Total	...	...	...	8,301

XI.—CHICKENPOX.

1,387 cases of chickenpox were reported during the year, of which 6 were port cases, 93 extra-urban cases, and 1,288 town cases, as against 1,520 town cases in the previous year.

Chickenpox was prevalent throughout the year as Statement (28) shows.

The majority of these cases occurred in the crowded chummeries in the congested parts of the city where Malayalee workmen from Malabar usually congregate. Many of these cases were due to contact infection, and so long as housing conditions of this class of people remain what they are a high incidence of chickenpox must be expected in the city.

There were no deaths even among children under one year and adults over 60 years of age.

Statement (29) shows distribution by age. The largest number of cases occurred between the age periods of 15 years and 40 years.

Statement (30) shows that the Malayalees of South India were the greatest sufferers.

(28) *Chickenpox during the Year 1929. (Town Cases.)*
Monthly Incidence.

Month.	No. of Cases.	Month.	No. of Cases.
January ...	63	September ...	82
February ...	178	October ...	102
March ...	146	November ...	93
April ...	204	December ...	33
May ...	116		
June ...	84	Total ...	1,288
July ...	94		
August ...	93		

(29) *Chickenpox in Colombo Town during the Year 1929. (Town Cases.)*
Distribution according to Age.

Age Period.	No. of Cases.	Age Period.	No. of Cases.
Under 1 year ...	6	30 years and under 35 ...	147
1 year and under 2 ...	5	35 years and under 40 ...	85
2 years and under 3 ...	5	40 years and under 50 ...	85
3 years and under 4 ...	5	50 years and under 60 ...	21
4 years and under 5 ...	5	60 years and under 70 ...	4
5 years and under 10 ...	28	70 years and under 80 ...	3
10 years and under 15 ...	59	80 years and over ...	1
15 years and under 20 ...	189		
20 years and under 25 ...	386	Total ...	1,288
25 years and under 30 ...	254		

(30) *Chickenpox in Colombo Town, 1929. (Town Cases.)*
Racial Incidence.

Race.	No. of Cases.	Race.	No. of Cases.
Malayalees ...	830	Europeans ...	4
Sinhalese ...	235	Others ...	3
Tamils ...	114		
Burghers ...	47	Total ...	1,288
Moors ...	47		
Malays ...	8		

XII.—MEASLES.

888 cases of measles were reported during the year, of these 1 was from the port, 56 extra-urban. and 831 town cases, as against 612 in 1928. The largest number of cases occurred during the first four months of the year (*vide* Statement (31)) and between the age periods of under 1 to 15 years (*vide* statement (32)).

There were 4 deaths, 3 among children under 5 years of age and 1 in an adult female aged 38 years. The three children died of complications arising from the primary disease and the adult died of heart failure due to fatty degeneration of the heart.

(31) *Monthly Incidence of Measles. (Town Cases only.)*

Month.	No. of Cases.	Month.	No. of Cases.
January ...	234	September ...	18
February ...	132	October ...	7
March ...	166	November ...	6
April ...	104	December ...	9
May ...	33		
June ...	29	Total ...	831
July ...	52		
August ...	41		

(32) *Measles, Town Cases, 1929.—Number at each Age Period.*

Age Period.	No. of Cases.	Age Period.	No. of Cases.
0 to 5 years ...	234	35 to 40 years ...	4
5 to 10 years ...	268	40 to 50 years ...	1
10 to 15 years ...	139	50 to 60 years ...	—
15 to 20 years ...	90	60 years and over ...	1
20 to 25 years ...	61		
25 to 30 years ...	26	Total ...	831
30 to 35 years ...	7		

XIII.—DIPHTHERIA.

There were 48 cases of diphtheria and 7 deaths reported during the year, of which 1 case was from the port, 14 from outside city limits, and 33 from the town, as against 20 town cases in the previous year. Out of the 33 cases 4 ended fatally.

The majority of the cases, namely, 31, occurred among children under 15 years of age, and more males than females were affected (*vide* Table (33)).

Two cases were due to direct contact infection from the sick and two cases from two different boys' schools were due to association with carriers. The sources of infection in the other cases were not definitely traced.

(33) *Diphtheria, 1929. (Exclusive of Port and Outside Cases.)*

Race and Sex Distribution.

Race.	Sex.	0 to 5 Years.	5 Years to 10 Years.	10 Years to 15 Years.	15 Years to 20 Years.	20 Years to 25 Years.	25 Years to 30 Years.	30 Years to 35 Years.	35 Years to 40 Years.	40 Years to 50 Years.	50 Years to 60 Years.	60 Years and Over.	Total.	Total of each Race.	Number of Deaths.
All Races	... { Males ...	13	5	2	—	—	—	—	—	—	—	—	20	33	4
	... { Females ...	4	2	5	1	—	—	—	—	1	—	—	13		
Europeans	... { Males ...	—	—	—	—	—	—	—	—	—	—	—	—	2	—
	... { Females ...	1	—	—	—	—	—	—	—	1	—	—	2		
Burghers	... { Males ...	6	1	—	—	—	—	—	—	—	—	—	7	8	1
	... { Females ...	—	—	1	—	—	—	—	—	—	—	—	1		
Sinhalese	... { Males ...	3	3	1	—	—	—	—	—	—	—	—	7	15	1
	... { Females ...	3	2	3	—	—	—	—	—	—	—	—	8		
Tamils	... { Males ...	1	1	—	—	—	—	—	—	—	—	—	2	3	—
	... { Females ...	—	—	1	—	—	—	—	—	—	—	—	1		
Moors	... { Males ...	3	—	1	—	—	—	—	—	—	—	—	4	5	2
	... { Females ...	—	—	—	1	—	—	—	—	—	—	—	1		
Malays	... { Males ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	... { Females ...	—	—	—	—	—	—	—	—	—	—	—	—		
Others	... { Males ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	... { Females ...	—	—	—	—	—	—	—	—	—	—	—	—		

XIV.—DIARRHŒA AND DYSENTERY.

(a) *Diarrhœa and Enteritis.*

There were 828 deaths, as against 572 in the previous year.

(b) *Dysentery.*

Dysentery was made a reportable disease as from January 1, 1929. There were 598 cases reported during the year, but of these 7 were from the port and 156 from outside the Municipal area. Of the 435 town cases, 75 were fatal which represents a death-rate of 0·28 per 1,000.

(34) *Diarrhœal Diseases, 1929—Deaths by Race. (Inclusive of Port and Outside Cases.)*

Cause of Death.	All Races.		Euro-peans.		Bur-ghers.		Sin-halese.		Tamils.		Moors.		Malays.		Others
Diarrhœa and Enteritis..	828	...	2	...	38	...	482	...	175	...	91	...	17	...	23
Dysentery	198	...	1	...	9	...	102	...	56	...	21	...	4	...	5
All Diarrhœal	1,026	...	3	...	47	...	584	...	231	...	112	...	21	...	28

(35) *Deaths from Diarrhœal Diseases, 1929.—Mortality by Months (inclusive of Port and Outside Cases.)*

Month.		Diarrhœa and Enteritis.		Dysentery.		Total.	
January	76	...	20	...	96
February	48	...	7	...	55
March	44	...	10	...	54
April	44	...	13	...	57
May	53	...	14	...	67
June	69	...	11	...	80
July	78	...	18	...	96
August	103	...	16	...	119
September	104	...	18	...	122
October	73	...	17	...	90
November	64	...	22	...	86
December	72	...	32	...	104
Total		...	828		198		1,026

(36) *Dysentery Cases, 1929.—Incidence by Ward.*

Ward.	No. of Cases.	Ward.	No. of Cases.
Slave Island	41	Cinnamon Gardens	10
New Bazaar	35	Bambalapitiya	7
Maradana North	32	Pettah	2
Kotahena	31	Fort	1
Wellawatta	27	Jails	19
Kollupitiya	19	Untraced	133
Mutwal	16	Port	7
San Sebastian	15	Beyond Municipal limits...	156
St. Paul's	13		
Timbirigasyaya	12		
Maradana South	11		
Dematagoda	11		
		Total	598

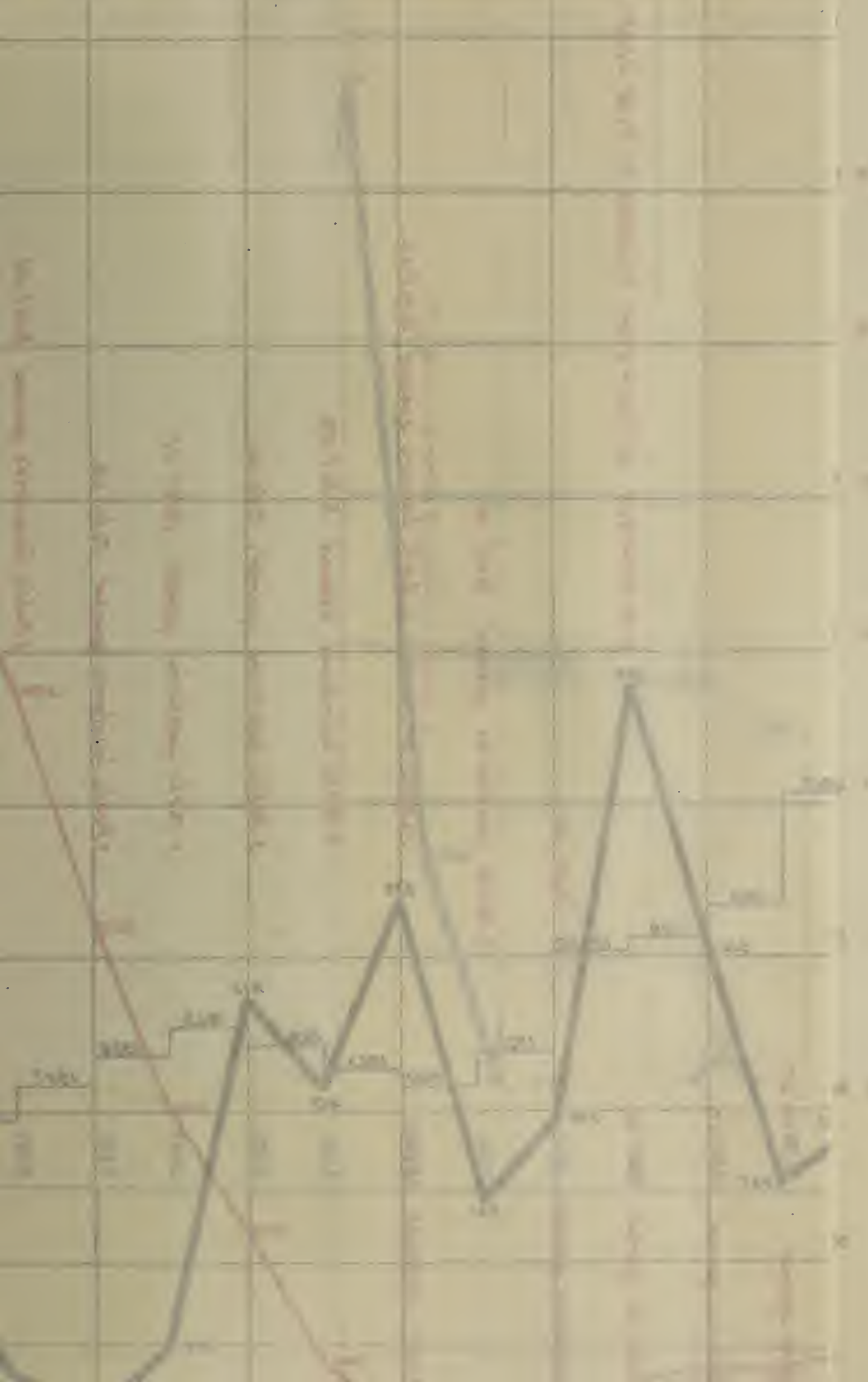
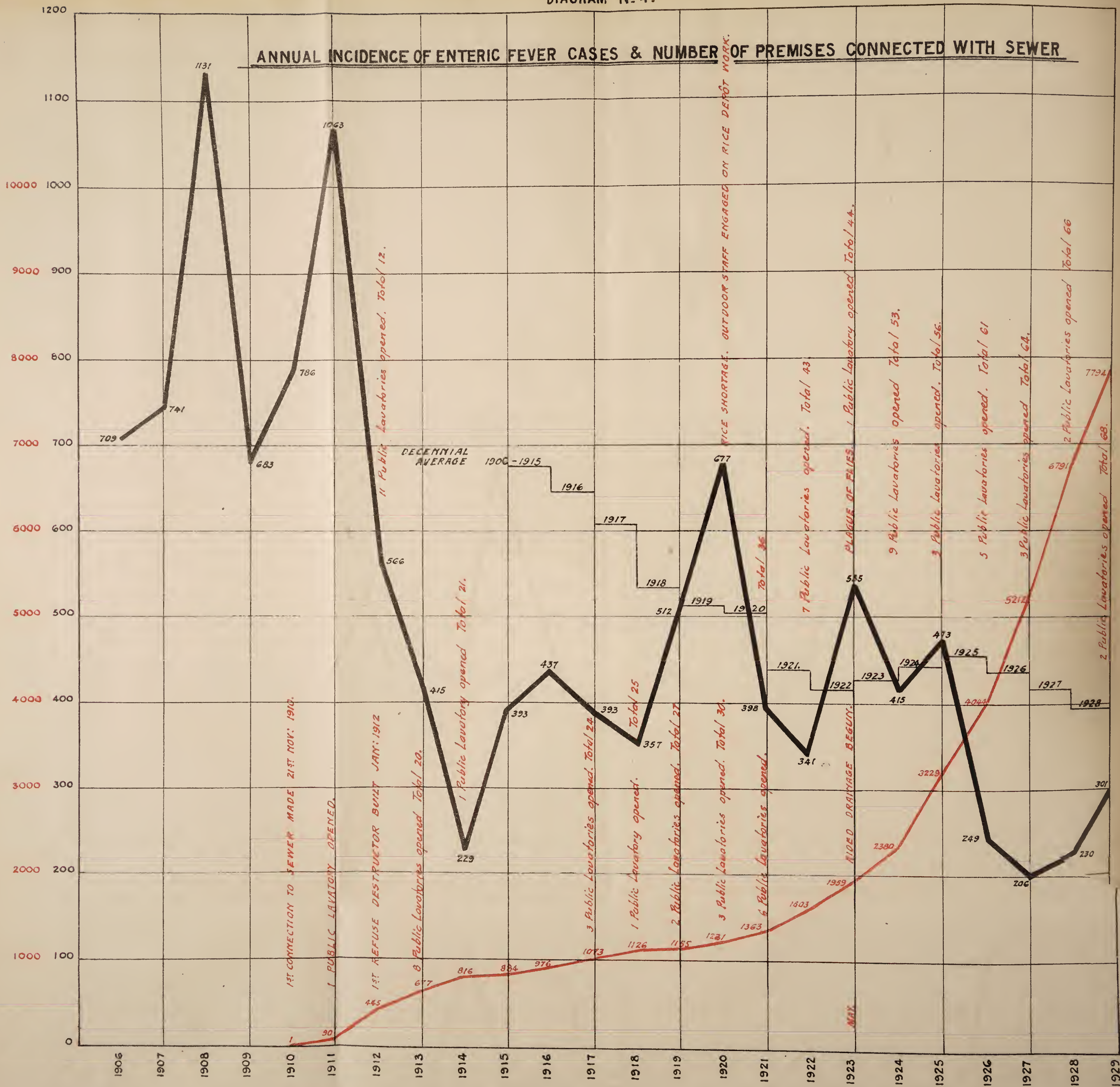


DIAGRAM No 4.

ANNUAL INCIDENCE OF ENTERIC FEVER CASES & NUMBER OF PREMISES CONNECTED WITH SEWER



XV.—TYPHOID FEVER.

Typhoid fever is one of the major public health problems in Colombo. Its incidence is still very high and disquieting and compares unfavourably with that obtaining in Europe or the United States of America.

Statistics show that in Colombo as elsewhere the largest number of cases occur in youth and early adult life, the age period between 20 and 25 years being the most susceptible. So that at the period of greatest expectancy and promise typhoid fever strikes down its victims, and if we adopt the American method of evaluating human life in dollars, we shall be amazed at the economic loss sustained by the city from typhoid fever alone.

Whipple evaluates an adult life at \$ 4,634 which, with total cost through disability for those cases that did not die, bring the total for each death to a loss to the community of \$ 6,000. Another American authority computes the value of each death to the community at something like \$ 4,000, which is stated to be a very moderate estimate. The cost of each case for loss of wages, treatment, and nursing is, in addition, \$ 128.

Human life in Ceylon is not a whit cheaper than life in America or elsewhere, and if we place the value of a life, say, at \$ 5,000, then, in the last four years, the period I propose to review, the 336 deaths that occurred in Colombo must have cost the city on this basis \$ 1,680,000 or, in our currency at the rate of Rs. 3 per dollar, Rs. 5,040,000 or an average of Rs. 1,260,000 per annum.

In addition to the actual mortality and economic loss caused by typhoid fever it possesses another unfavourable feature and that is it diminishes for a certain length of time the powers of resistance in those who have recovered from an attack. An American statistician has estimated that the incidence of mortality in recovered cases for the following three years is over twice that among normal persons. That is to say if the normal expectation of death for each of these three years is taken as 100, the expectation in typhoid recovered cases is 204.

Yet another characteristic feature of the disease is a tendency to complications which extends the period of illness—which even in mild cases average about 21 days—to several weeks with consequent suffering, disability, and cost to the individual. In a certain case which came closely under the writer's notice the illness lasted for over eight weeks and the cost to the husband for doctors, nurses, and attendant's fees medicines, change during convalescence, &c., was approximately Rs. 6,000! Typhoid fever is therefore an expensive disease for any city to tolerate, and as it is largely a preventible disease, money spent in adopting preventive measures is money well invested.

The subject of typhoid fever in Colombo was dealt with at some length by my predecessor, Dr. Marshall Philip, in his Annual Report for 1925, so that it is not necessary for me to review the situation beyond 1926. It is therefore proposed in this report to examine the subject as fully as the available information and statistics in this office permit only for the period 1926–1929, and the subject will be dealt with under the following heads :—A.—Incidence of typhoid fever in Colombo; B.—The sources and common modes of infection; and C.—Future preventive measures.

A.—Incidence of Typhoid Fever in Colombo.

Typhoid fever was declared a notifiable disease late in the year 1903, but as the figures prior to 1906 are incomplete and unreliable Diagram IV. shows a graph only from 1906. From this it will be seen that on the whole the trend of the curve has been definitely downwards. Owing to mistakes in diagnosis and failure to report mild and unrecognized cases a more accurate picture of the incidence of typhoid fever would be obtained by a mortality curve, but unfortunately the mortality rates obtainable prior to 1926 include also many deaths of non-residents of Colombo.

The following statement shows the morbidity and mortality rates from 1926 to 1929 among Colombo residents. So far the lowest death-rate was recorded in the year 1927, when it was 26 per 100,000. The death-rate in more advanced countries of Europe and in the United States of America is below 10 per 100,000.

Year.	No. of Cases.	Morbidity Rate per 100,000.	No. of Deaths.	Mortality Rate per 100,000.
1926	249	96	87	34
1927	206	79	66	26
1928	230	86	72	27
1929	301	112	111	41

Incidence by Age Period.

Statement (a) below shows the incidence of typhoid fever by age periods during the years under review. The largest number of cases occurred between the age period 10 to 35, the period 20 to 25 years being the most susceptible. The large number of cases between 0 to 10 years is probably due to indirect infection *via* infected soil—fingers to mouth.

(a) Enteric Fever Cases by Age Periods, 1926—1929 (exclusive of Port and Outside Cases).

Year.	0 to 5 Years.	5 to 10 Years.	10 to 15 Years.	15 to 20 Years.	20 to 25 Years.	25 to 30 Years.	30 to 35 Years.	35 to 40 Years.	40 to 50 Years.	50 to 60 Years.	60 and Over.	Total
1926	8	21	42	43	39	40	24	10	12	5	5	249
1927	8	23	21	42	36	34	14	11	13	4	—	206
1928	3	14	26	30	60	37	17	19	16	8	—	230
1929	8	23	42	46	65	42	30	14	22	6	3	301

Incidence by Race and Sex.

Table (b) shows the incidence by race and sex. Out of a total of 986 town cases during the period under review, 601 or 60·9 per cent. occurred amongst the Sinhalese; next came the Tamils with 102 cases or 10·3 per cent.; then others with 100 cases or 10·1 per cent.; and fourthly Burghers with 90 cases or 9·1 per cent.

The racial case-and death-rates for the four years are given in Table (c) but these rates should be accepted with reserve as the estimates of population are considered too low.

Taking the incidence by sex amongst all races more males were affected than females. The very low figure for females under "Others" is due to the fact that the Malayalee immigrants rarely bring out their females with them.

(b) Enteric Fever Cases, by Race and Sex, 1926—1929 (inclusive of Port and Outside Cases).

Race.	1926.			1927.			1928.			1929.			Total.	
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.
Europeans ...	1	4	5	—	—	—	3	2	5	5	3	8	9	9
Burghers ...	12	14	26	14	8	22	8	7	15	13	14	27	47	43
Sinhalese ...	85	78	163	42	66	108	93	46	139	104	87	191	324	277
Tamils ...	14	2	16	14	11	25	18	4	22	28	11	39	74	28
Moors ...	7	1	8	8	8	16	11	2	13	8	3	11	34	14
Malays ...	5	1	6	3	5	8	6	4	10	1	2	3	15	12
Others ...	23	2	25	25	2	27	25	1	26	22	—	22	95	5
All Races ...	147	102	249	106	100	206	164	66	230	181	120	301	593	388

(c) Enteric Fever by Race 1926—1929. Case-rate and Death-rate per 1,000 Population (exclusive of Port and Outside Cases.)

Race.	1926.				1927.				1928.				1929.			
	No. of Cases.	Case-rate.	No. of Deaths.	Death-rate.	No. of Cases.	Case-rate.	No. of Deaths.	Death-rate.	No. of Cases.	Case-rate.	No. of Deaths.	Death-rate.	No. of Cases.	Case-rate.	No. of Deaths.	Death-rate.
Europeans ...	5	0·17	1	0·03	—	—	—	—	5	0·16	—	—	8	0·26	1	0·03
Burghers ...	26	1·65	7	0·44	22	1·38	2	0·13	15	0·93	4	0·25	27	0·66	9	0·55
Sinhalese ...	163	1·34	53	0·45	108	0·88	34	0·28	139	1·12	43	0·35	191	1·52	72	0·57
Tamils ...	16	0·28	12	0·21	25	0·43	7	0·12	22	0·37	9	0·15	39	0·66	15	0·25
Moors ...	8	0·19	4	0·09	16	0·38	6	0·14	13	0·30	5	0·12	11	0·25	4	0·09
Malays ...	6	0·97	1	0·16	8	1·27	3	0·48	10	1·58	4	0·63	3	0·47	3	0·47
Others ...	25	1·94	9	0·69	27	2·10	14	1·07	26	1·97	7	0·53	22	1·65	7	0·52
All Races ...	249	0·96	87	0·34	206	0·79	66	0·26	230	0·86	72	0·27	301	1·12	111	0·41

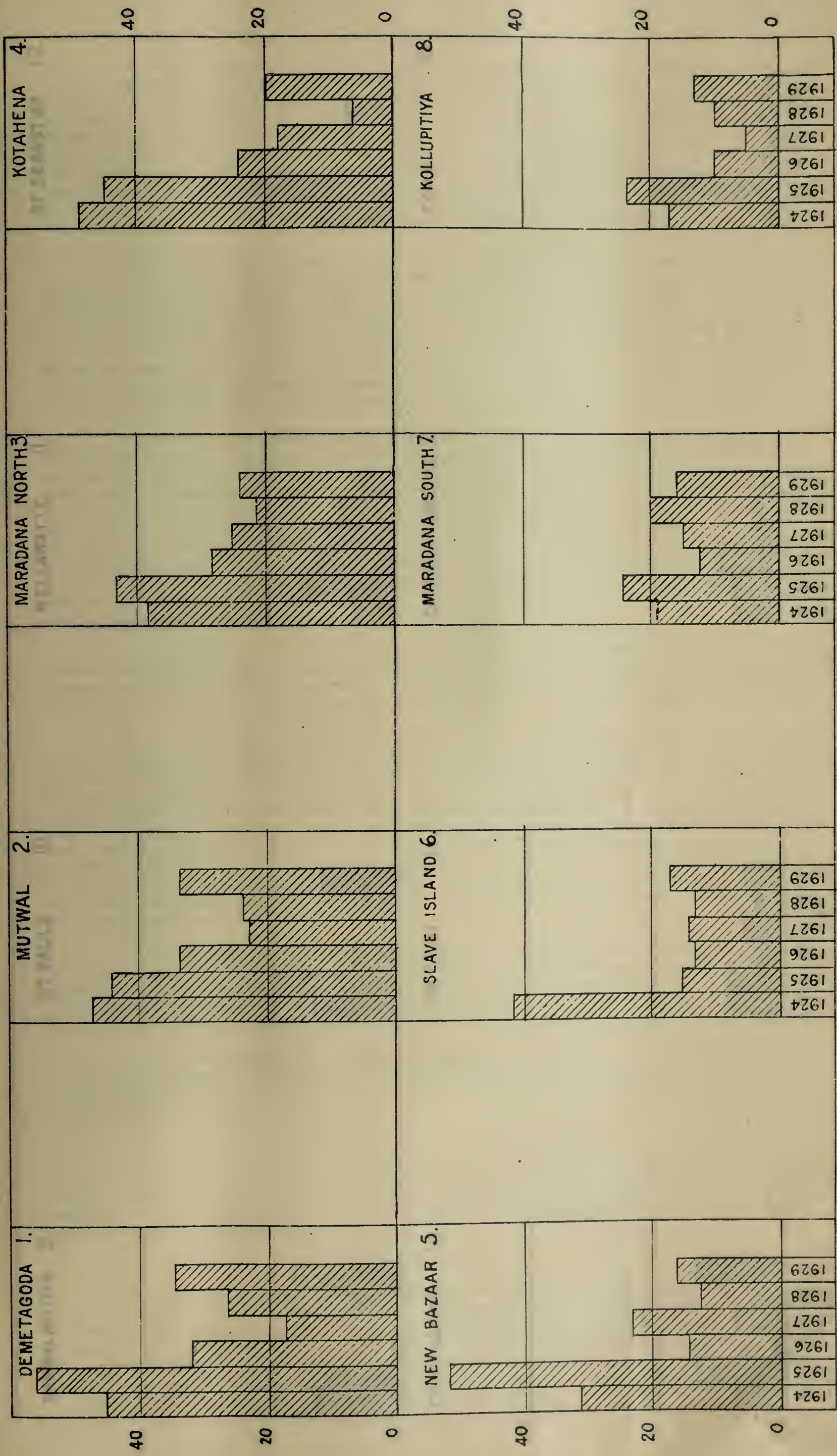
Incidence by Occupation.

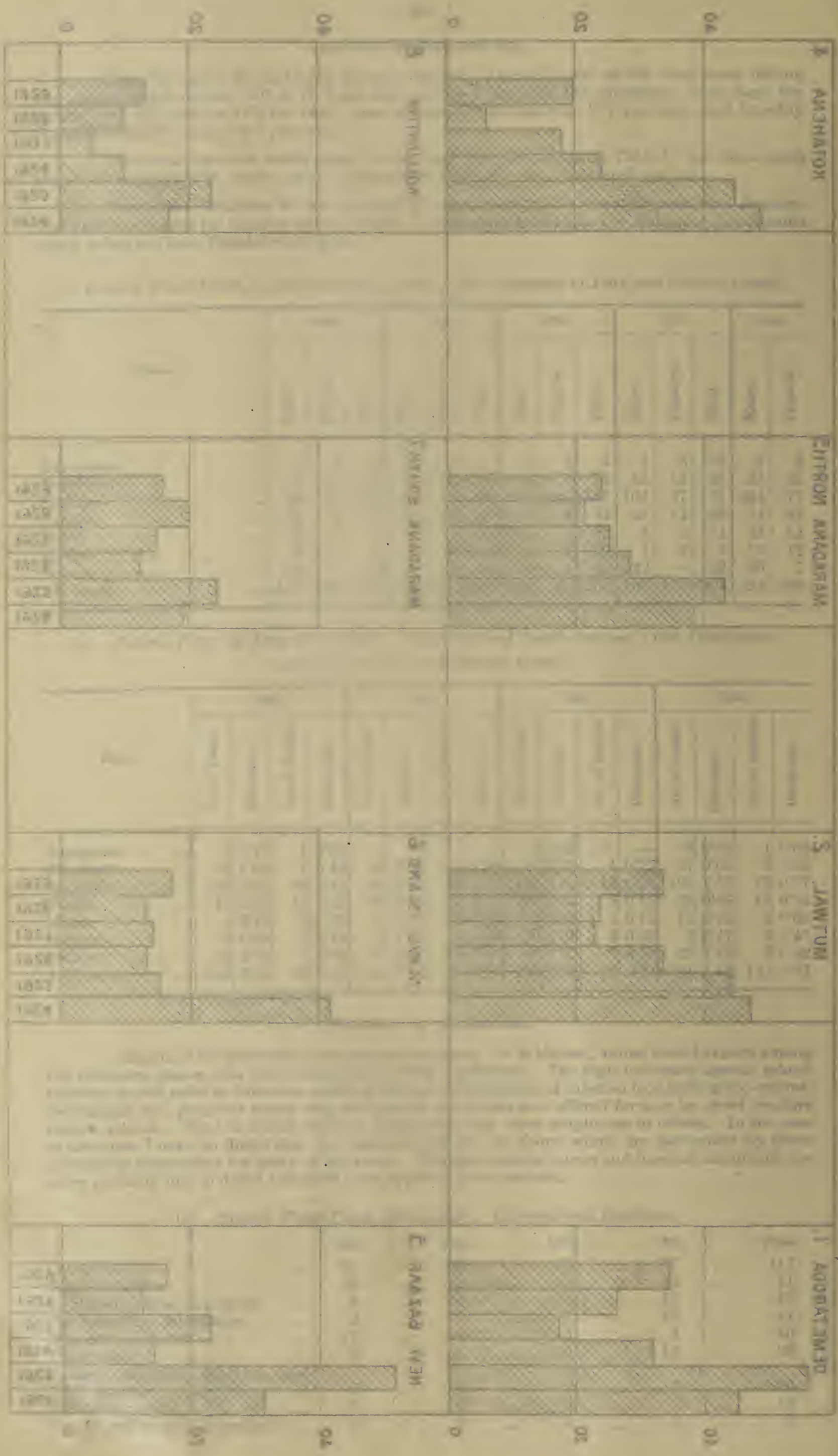
Statement (d) shows the occupational incidence. It is highest, as one would expect, among the labouring classes who live under unfavourable conditions. The high incidence among school children would point to infection acquired through consumption of infected food such as ice-creams, sweetmeats, &c., prepared under very unhygienic conditions and offered for sale by street vendors outside schools. Next to school children come clerks and other employees of offices. In the case of this class I have no doubt that the eating-houses and tea shops which are patronized by them are mainly responsible for many of the cases. The cases among nurses and hospital attendants are more probably due to direct infection from typhoid fever patients.

(d) Enteric Fever Cases, 1926—1929. Occupational Incidence.

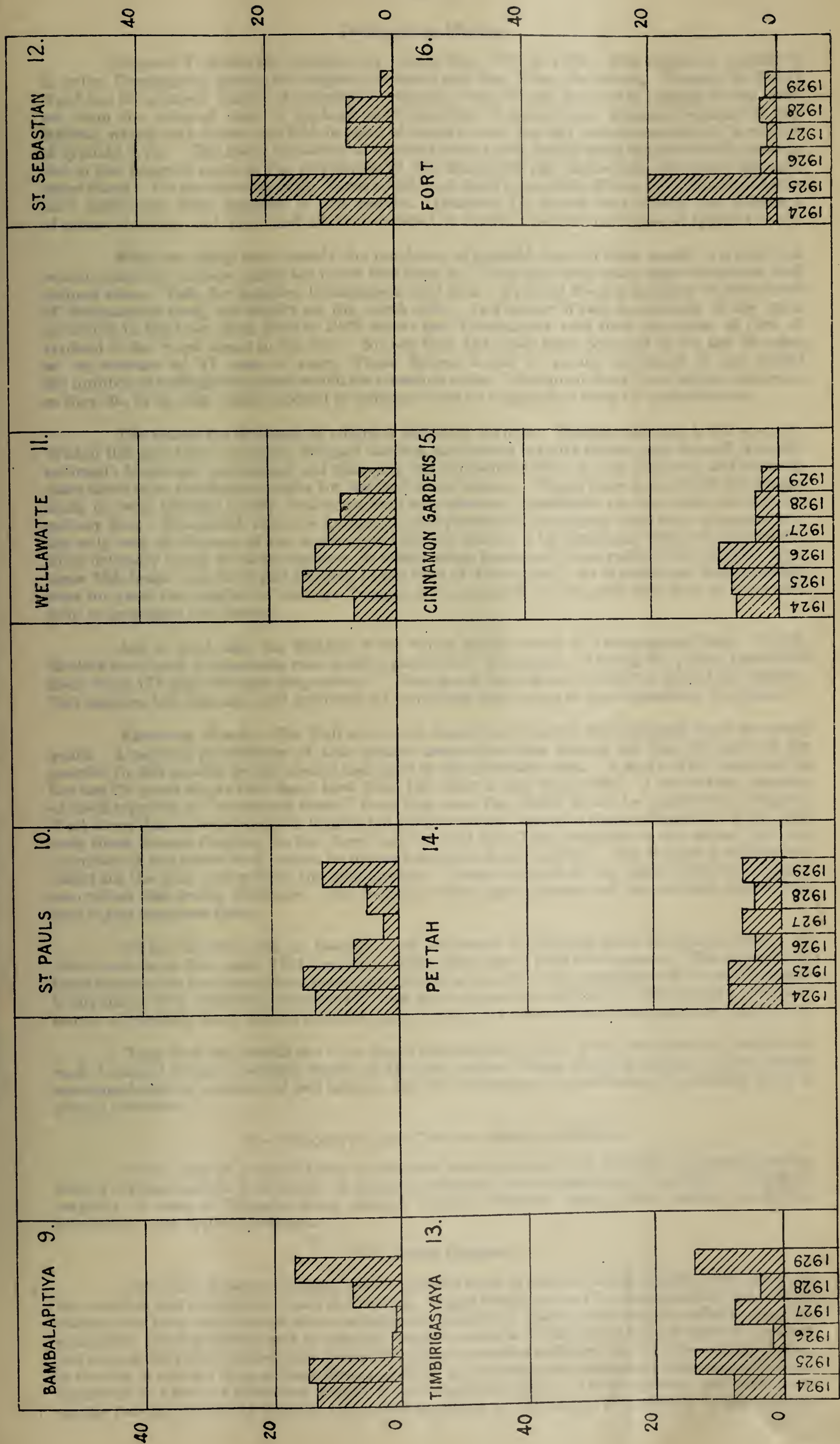
	1926.	1927.	1928.	1929.	Total.
Labourers ...	34	23	33	27	117
School children ...	26	8	13	24	71
Clerks and office employees ...	9	10	12	18	49
Workmen and mechanics ...	9	6	8	18	41
Domestic servants ...	10	8	13	9	40
Tradesmen ...	5	2	9	12	28
Police constables, watchers, and jail guards ...	3	7	7	3	20
Professional men ...	3	2	5	8	18
Nurses and hospital attendants ...	2	2	1	3	8

INCIDENCE OF ENTERIC FEVER CASES, BY WARDS. 1924 - 1929. DIAGRAM Nº 5.





INCIDENCE OF ENTERIC FEVER CASES, BY WARDS. 1924 - 1929. (CONTD.)



Incidence by Wards.

Diagram V. shows the incidence by wards from 1924 to 1929. The wards are numbered in order, Dematagoda having the highest incidence and Fort Ward the lowest. Though St. Paul's Ward has the greatest density of population, namely, over 150 and under 200 persons to the acre, yet from the point of view of typhoid fever incidence it ranks tenth, whereas Dematagoda and Mutwal, which rank fourth and fifth in point of density, rank first and second respectively in respect of typhoid fever. The lower incidence of typhoid fever in St. Paul's Ward is undoubtedly mainly due to the progress made in the conversion of the dangerous pail latrine into the more sanitary water closet. On the other hand the wards which rank high from point of view of typhoid incidence have made very little progress in this respect. Diagram IV. shows very clearly the influence of proper drainage and quick and efficient disposal of excreta upon the incidence of typhoid fever.

When we study more closely the incidence of typhoid fever in these wards, it is seen that certain localities in these wards are never free from it. Year after year cases occur in certain well defined areas. Take for instance, Dematagoda, road area. Typhoid fever is endemic on both sides of Dematagoda road, but chiefly on the north side. As a matter of fact an analysis of the cases occurring in the town from 1903 to 1929 shows that Dematagoda road from the point of view of typhoid is the worst street in the city. No less than 444 cases have occurred in the last 26 years or an average of 17 cases a year. These figures would be greatly increased if one added the number of undiagnosed cases which are classified under "continued fever" but which, occurring as they do, in an area where typhoid is rampant must be regarded as cases of typhoid fever.

The reason for this state of affairs is perfectly obvious. Dematagoda road is not sewered. Within this area there are nearly 500 pail latrines, the ground is badly abused, and the soil is highly polluted; Municipal scavenging and cleansing are impossible owing to lack of access, and in many cases there is no satisfactory outlet for the foul waste waters. Where there is an outlet the sullage finds its way through a very foul drain into neighbouring grassfields on the north side of the railway line. Household refuse is dumped in compounds as scavenging carts have no access, and the only way of disposal of the accumulated organic matter is by occasional burial in compounds. Flies naturally breed in large numbers in these refuse heaps and act as carriers of infection from these filth heaps and dirty pail latrines to the food of the people. As typhoid has been endemic here for years the number of carriers living in this area must also be great and they in their turn help to propagate the disease.

Let us next take the Mutwal Ward which ranks second to Dematagoda Ward. In the Modera street and Alutmawata road areas typhoid fever is endemic. During the period 1903-1929 there were 171 and 246 cases respectively. Here again one has not to seek far to find the reasons. Pail latrines, bad drainage, soil pollution all contribute their share to the endemicity of typhoid.

Kotahena Ward.—The Wall street area has never been free from typhoid fever for many years. A medical practitioner of this district assured me that during the last 20 years of his practice in this locality he has always had cases in this particular area. A study of the cases during the last 26 years shows that there have been 145 cases in this small area. If we add the number of cases reported as "continued fever" from this area, the figure would be considerably higher. Wall street has a sewer along its length, but unfortunately owing to the configuration of the land only those houses fronting on the street can be, and have been, drained to the sewer, but the premises on the lower level cannot be drained as levels do not permit. Nor is there a satisfactory outlet for the foul waters from the pail latrines. There is a field on the eastern side of the road into which the drains discharge. The field is a water-logged marsh and the sewage discharging into it just stagnates there.

Of late another area in Baseline road has begun to produce cases of typhoid fever. In 1926 there were five cases, 1927 four cases, 1928 three cases, 1929 eleven cases. The majority of these occurred in the Crown land behind the prison where there is a population of about 500 people living under very primitive conditions in mud huts without any latrines for their use and where the source of drinking water is from polluted shallow wells and where refuse is not properly disposed of.

Time does not permit me to go into a description of other areas, but there is a number of such localized areas in several wards of the city where owing to entire absence of any latrine accommodation or presence of pail latrines, bad or no drainage, soil pollution, &c., typhoid fever is always prevalent.

B.—The Sources and Common Modes of Infection.

Every case of typhoid fever arises from some previous case through (a) direct infection from a typhoid patient or through (b) indirect infection from a patient or a "carrier." The large majority of cases in Colombo arises through indirect infection chiefly from carriers, and a fair proportion from typhoid patients.

(a) Direct Infection.

The class of people amongst whom typhoid fever is most prevalent regards with disfavour the isolation and treatment of cases in hospital. Home treatment may be alright among the affluent classes who have large houses where satisfactory isolation is possible and who can afford to pay for competent medical advice and to employ trained nurses and attendants to look after the patient, but among the poorer classes, who unfortunately are the chief sufferers, their house accommodation is limited to one or two or at most three rooms for all purposes, and satisfactory isolation and proper treatment of a case of infectious disease is well nigh impossible. All the nursing and attendance on the patient necessarily devolve on various members of the family, all perfectly ignorant about

the nature and mode of infection and sublimely indifferent about strict personal cleanliness. The figures for the years 1926, 1927, and 1928 are not available, but during 1929 out of a total of 301 town cases only 170 cases were hospitalized and out of the rest 11 occurred in the prison, 56 were not traced owing to incorrect or vague addresses being given, and 64 were treated in patients' own homes, which in 11 cases were wholly unsuitable both from the view point of the patient and the community. It may be asked why, in these cases, the powers conferred by the Prevention of Diseases Ordinance in respect of removal and isolation of infectious diseases were not exercised. The reply is that the majority of cases are reported to this Department in the third week of the disease when patient's condition is such that one naturally hesitates to transport a patient who is in a critical condition, by motor ambulance over a country road to a hospital six miles distant from the town, in the face of opposition by the patient's relatives and against not infrequently the wishes of the medical attendant. Any unfortunate complications that might arise endangering the life of the patient or resulting in death might conceivably be attributed to such removal and the Council held responsible for it. In cases treated at home the danger of direct infection through soiled hands, or through the use of cups and spoons used by the patient, or the consumption of any remnants of food left over by the patient, is great. This being the shortest and most direct route of infection is therefore the most dangerous as the infecting organisms undergo no deterioration by any length of existence outside the human body. Last year there were 30 contact cases, and I have no doubt that a fair percentage of this number was due to direct infection.

(b) *Indirect Infection.*

The source of infection may be an active case, *i. e.*, a patient, or a recovered case, *i. e.*, a carrier. The mode of infection by which the contagium is transmitted from either of the above sources to the healthy varies widely.

The principal modes of infection in Colombo will now be considered.

(1) *Fingers-Food-Mouth.*

As stated above a number of cases of typhoid fever are treated at home during the whole course of the disease. In such cases infection may take place either directly as explained in (a) above or indirectly through consumption of food contaminated by soiled fingers.

Late diagnosis and notification of cases is undoubtedly responsible for the large number of secondary typhoid fever cases derived from primary cases in the incubation period and the first three weeks of the disease. A study of 181 cases which occurred last year shows that—

- 13 cases were notified in first week of disease.
- 71 cases were notified in second week of disease.
- 78 cases were notified in third week of disease.
- 7 cases were notified in fifth week of disease.
- 8 cases were notified in sixth week of disease.
- 2 cases were notified in seventh week of disease.
- 1 case was notified in eighth week of disease.
- 1 case was notified in ninth week of disease.

When the source of infection is known, such as a diagnosed case of typhoid fever, one can to some extent guard against infection, but in the case of a patient in the incubation period of the disease when apparently the patient is well but nevertheless dangerous or in an undiagnosed case or in an undetected "carrier" the danger is greater as the source is not suspected. In these cases food is liable to be contaminated by soiled fingers, and the consumption of such food gives rise to secondary cases of fever among the people living in close contact with such cases. The habit so common in Ceylon of relatives and sympathizing friends visiting the sick and even partaking of food, betel, &c., is probably responsible for quite a fair number of cases. In Colombo the highest percentage of cases is undoubtedly due to this mode of infection, the source being in the largest number of cases a carrier. After recovery from an attack of typhoid fever the bacilli may persist for varying lengths of time (three months to several years) in from 4 to 11 per cent. of the cases. The number therefore of carriers in Colombo must be very considerable and they are responsible for from 25 to 50 per cent. of all typhoid cases. It has been found that the percentage of women among carriers is higher, and as they are chiefly concerned with the handling and cooking of food indirect infection through soiled fingers-food-mouth is common. In two small outbreaks which occurred in Colombo a few years ago women carriers were found to be responsible; the dissemination being done in one case through "*appas*" ("hoppers") and in the other through salad leaves. Eating-houses, tea-boutiques, ice-cream, sweetmeats, &c., prepared in the slums and sold in the streets are all responsible in various degrees for this mode of transmission, *vide* Statement (d) for incidence among school children, clerks, &c.

(2) *Flies-Food-Mouth.*

Flies play a very important rôle in conveying infection either by mechanically carrying the organisms on their bodies or by eliminating them in their faeces after ingestion and passage through their gut. As Diagram IV. shows the upward trends in the curve in 1923 and 1925 were mainly due to flies breeding both in the Municipal dump and many other unauthorized dumps within the city. When the only Refuse Destructor in Colombo was either out of commission, or during rainy weather was unable to deal with all the wet refuse, a certain quantity of town refuse containing much decomposing and faecally polluted organic matter was dumped in certain places which proved excellent breeding places for flies. The fly nuisance has now abated very considerably in the Municipal dumps as a result of the very efficient manner in which the refuse is now covered over and the smouldering fires kept going after spraying with liquid fuel. Unauthorized private

dumps and the many grassfields within the town, which are stealthily manured with horse and cattle dung or with town refuse stolen from dust bins or purchased from scavenging coolies for a small consideration, also provide excellent breeding places for flies which after feeding on the dejecta in pail latrines invade houses and infect the food of the people. Colombo still has 8,500 buckets conserved daily, and these pail latrines not being fly proofed are a source of potential danger. When one takes into consideration the large number of undetected carriers, the number of undiagnosed cases and the number of cases diagnosed late and the cases in the incubation stage when the faeces is infective it is not difficult to appreciate what an important rôle this method of transmission plays.

Diagram IV. shows the great improvement effected in the incidence of typhoid fever in Colombo since the introduction of the water carriage system. The drop in the curve is marked since the adoption of the aided drainage scheme in May, 1925, whereby drainage of premises to sewer has been speeded up. Out of a total of approximately 21,800 separately assessed premises, only 7,794 or about a third of the town has been sewered. The provision of public lavatories numbering 68 at the end of 1929 in the crowded parts of the town where tenement compounds and surface drains were freely abused has contributed in no small measure to lowering the incidence of typhoid fever.

(3) *Water-Mouth.*

Contaminated water plays an important rôle in the dissemination of typhoid where public water supplies are drawn from lakes or rivers liable to contamination from sewage effluents. In Colombo the public water supply is above suspicion ; it is derived from a carefully protected upland surface catchment area situated at Labugama, 28 miles from Colombo ; it is regularly examined both chemically and bacteriologically and has given, so far as I am aware, no indication of any suspicious or dangerous contamination. As a source of infection it may therefore be unhesitatingly excluded. The graph in Diagram IV. also supports this view, for in spite of a very wholesome water supply the town has enjoyed for many years the incidence of typhoid fever has kept high and has been lowered mainly by the introduction of the water carriage system and consequent proper disposal of excreta. Water however does play, I have no doubt, a certain though not very important rôle in Colombo. The whole of Colombo is not supplied with pipe water from the public mains. In the outlying parts of Colombo like Rajamalwatta, Kolannawa, Yakbedda, &c., a pipe supply is not available within easy reach, and people living in these areas still depend upon shallow wells for their drinking water. The majority of these wells are exposed to contamination from excreta deposited on the ground in the neighbourhood of wells or from latrine washings polluted with urine and faeces percolating into these wells. Typhoid bacilli have been shown to survive in water for varying periods of time which increase directly with the purity of the water. Though marked multiplication does not take place in water which is unsuitable as a culture medium yet a resistant minority has been found to survive for several weeks or months and be capable of producing infection.

In 1929 ten cases of typhoid fever occurred among the people living on the Crown land behind the Welikada prison. This area is devoid of latrines, the ground is highly polluted, and the drinking water is derived from shallow wells. The source of infection may possibly have been these contaminated wells.

In addition to these shallow wells the water of which is used for drinking there are in Colombo 137 bathing wells. Though a large number of public lavatories have been provided by the Municipality where a bath in wholesome water is available free of charge yet a large number of people still prefer a bath in well water which is believed to be superior to pipe water. This belief is due, I imagine, to the fact that well water is much cooler than water conveyed in metal pipes under metallised streets, and a bath in lukewarm pipe water is not so cooling or refreshing as a bath in cooler well water. Other advantages the private bathing wells offer are hot water baths for a small payment and greater privacy. These bathing wells have been examined from time to time and some of them have been found to be polluted but owing to the opposition of vested interests and their popularity with a certain class of people they have not been abolished. The argument against their abolition is that though the water may be unfit for consumption it is good enough for bathing, but it has been proved that rinsing the mouth or brushing the teeth in contaminated water is attended with the risk of infection. Knowing the habits of the people here it may be assumed that some cases of typhoid fever are due to this source.

Other sources of infection are the river, canals, and lake. Large numbers of people living in the neighbourhood of these waters regularly bathe in these waters which are grossly polluted with sometimes unadulterated sewage. In 1925 a number of cases was traced to bathing in the river which is being polluted by the imperfectly treated sewage effluent discharged into it. The waters of the lake and canals are also still very impure and the risk of infection from these sources is probably considerable. In spite of prohibitory notices people will bathe in them. Regular police picketing is necessary to stop this, but that is expensive and not always available.

(4) *Water-Food-Mouth.*

Another method of transmission is by contaminated water to food to mouth. Contaminated water may be used for—

- (a) Adulterating milk. Unregistered vendors of milk are especially guilty of this. Not having proper dairies with a town water supply they use water from any source. A vendor was once detected using lake water.
- (b) For washing milk cans. An unregistered vendor was once detected using water from a road side drain.
- (c) Washing or watering green vegetables eaten uncooked. The majority of the vegetable gardens in Colombo use water from shallow wells which are polluted.

(5) *Soil-Fingers-Mouth.*

This is an important mode of infection in Colombo. Experiments have shown that although there is no multiplication of the organisms in the soil they may persist there under favourable conditions for from 74 days to 6½ months. Tenement compounds in Colombo are badly abused by children and even by adults and soil pollution is great except in the better residential districts. This is due to—

- (a) Absence of latrine accommodation.
- (b) Inadequate latrine accommodation.
- (c) Latrines not being within easy reach.
- (d) Latrines being unsuitable in type for young children.
- (e) Dirty habits of the people.

Children playing on such polluted grounds readily convey infection to their mouths or bring the infection on their feet to their homes and then indirectly through fingers to food and mouth, *vide* Statement (a) for incidence among children 0 to 10 years of age.

Soil pollution due to lack of drainage is also seen in the unsewered lanes of South Colombo. Every house has to deal with its sullage containing latrine washings, &c., by means of a sump which soon becomes a veritable cesspit. In the Wall street and Dematagoda areas especially soil pollution is extremely bad and accounts for the high incidence of typhoid in these areas. Typhoid bacilli have been shown to survive in fæces for from 15 to 30 days or longer so that in places where the ground is systematically polluted and condition of moisture, temperature, &c., are favourable the danger of infection by this mode is very great.

C.—Future Preventive Measures.

We have seen from section B above that the chief sources of infection are from carriers and from cases diagnosed and notified late in the course of the disease, and the commonest modes of transmission are by indirect infection through, in their order of importance, (1) fingers-food-mouth, (2) flies-food-mouth, (3) soil-fingers-food-mouth, and less commonly (4) water-mouth or water-food-mouth.

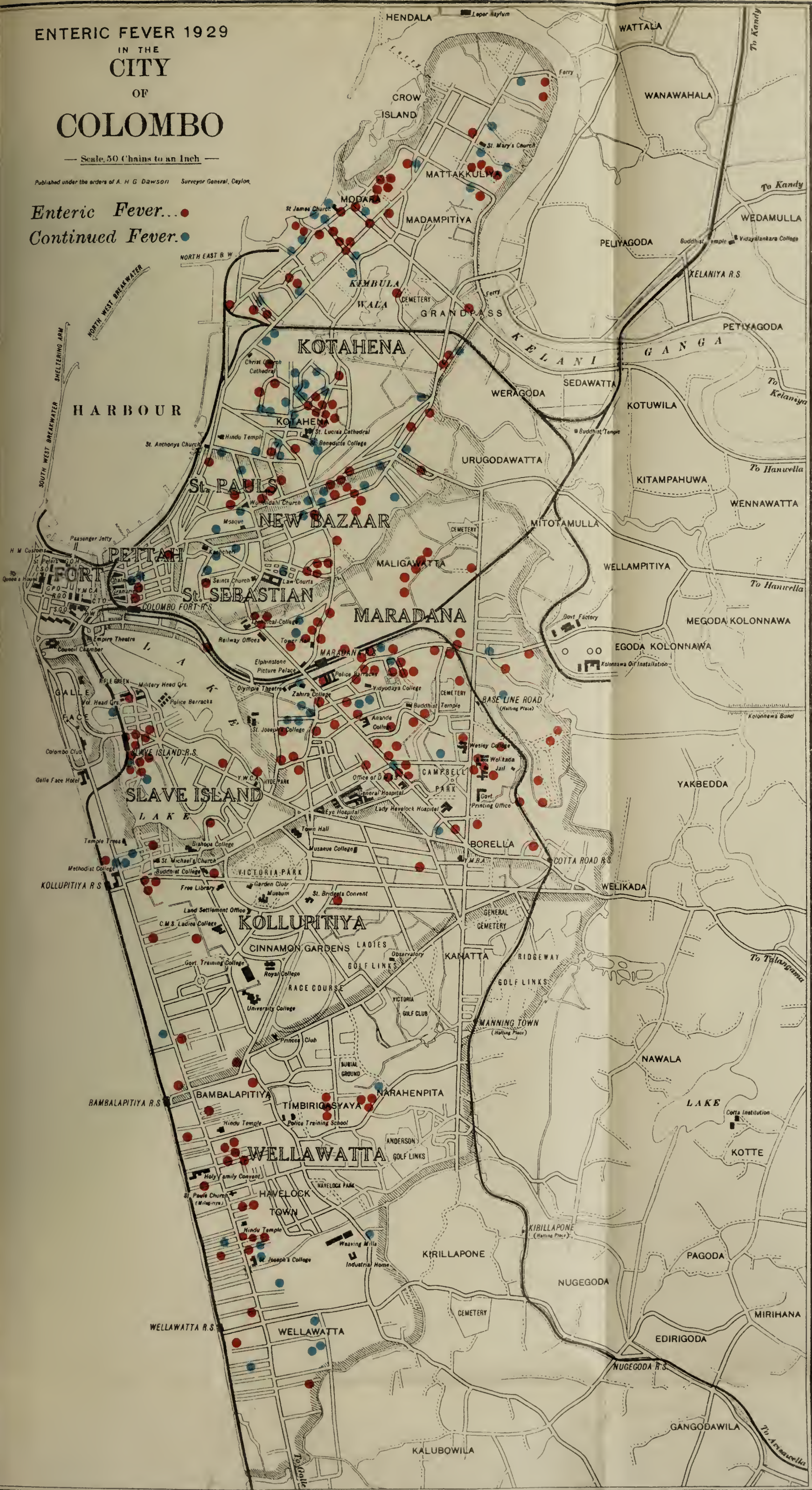
In regard to the problem of carriers this Department is not in a position to do anything very much. Without a bacteriological examination of very large numbers of people it would not be possible to detect all unsuspected carriers in the city. In cases that have been hospitalized convalescents might of course be detained until four negative stool examinations have been done, but in cases treated in patient's home by private practitioners the difficulty of getting material for bacteriological examination is very great as people show great reluctance to give specimens of urine or fæces. In these cases it is the duty of those who have gone through an attack to observe scrupulous cleanliness in their personal habits and to take the greatest care in the disposal of their excreta. They should also not engage in any trade or business connected with the handling or cooking of food especially in establishments catering to the public. It would be an excellent thing if in all such establishments employees were required to produce a certificate that they are not typhoid carriers.

In regard to the large numbers of cases diagnosed and notified late, the practice of a large number of people, especially the class who are chiefly affected, of resorting to quack and other unscientific methods of treatment renders early and correct diagnosis impossible. Where cases are seen from the beginning of the illness private medical practitioners might assist this Department to a greater extent by availing themselves early of the available laboratory aid in diagnosis without actually waiting for the development of the classical syndrome of typhoid. Diagnosis is possible in large numbers of cases even in the first week of the disease by means of blood cultures. Early correct diagnosis is essential if we are to prevent those secondary cases due to direct or indirect infection through fingers to mouth or fingers to food to mouth. Early correct diagnosis would also enable this Department to hospitalize a larger number of cases and thereby prevent the occurrence of secondary contact cases. From the point of view of the patient himself (I refer to the poorer classes of the population) treatment in a properly equipped hospital gives him a greater chance of recovery than in a small crowded house without proper nursing. For instance, among the 173 cases treated in hospital last year there were 52 deaths or 30·5 per cent. fatal cases and among the 64 cases treated in patient's own home there were 28 deaths or 43·8 per cent. fatal cases. The unreasonable and largely groundless prejudice against hospital treatment operates detrimentally to the patient's own interests. We must look to time and education to overcome these prejudices.

Next, in regard to practical measures that might be adopted by Council we have seen in the section dealing with the incidence of typhoid by wards that the disease recurs year after year in certain well defined areas such as chiefly Dematagoda road and Wall street. The remedy is also obvious. The Dematagoda area must be roaded and sewered so that it would be possible to scavenge the area properly and to abolish the pail latrines and substitute water closets and proper drainage. In the Wall street area a sewer between Wall street and Blomendahl road is needed in order to drain the premises and dispose of the excreta satisfactorily. In addition to these two sewers which are urgently needed the objective towards which efforts should be directed is the early complete sewerage of the town and abolition of the pail latrines. The danger from fly infection and soil pollution would then be removed to a very large extent. Diagram IV. shows the influence of proper disposal of excreta upon the incidence of typhoid fever in the city. Last year, for instance, there were 141 cases of typhoid fever in premises with pail latrine and 93 in premises with water closets.

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Enteric Fever... ●
Continued Fever. ●



CITY
OF
COLOMBO



PHTHISIS 1929 IN THE CITY OF COLOMBO

— Scale 50 Chains to an Inch —

Published under the orders of A. H. G. Dawson Surveyor General, Ceylon.



COLOMBO
IN THE
CITY
OF THE
BATHING 1825

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Next to the provision of soil sewers the open rain water drains in the slum districts should be replaced by underground sewers to prevent the abuse of these drains. More public lavatories should also be provided in all congested area in accordance with the list already submitted.

In order to deal with all the town refuse and to combat the fly nuisance Council has now under construction a second Refuse Destructor, but flies still breed in the many grassfields—of which there are 218 in the town—and in the various cattle sheds and dairies and private premises. Grassfields in the residential districts should be abolished as stealthy manuring is frequently done and it is not possible for the outdoor staff to make frequent enough inspections to prevent this. Fly breeding in cattle stables, &c., might be obviated by a by-law enforcing the provision of fly-larval trap manure enclosures as designed by Capt. E. Baber, R.A.M.C., and which are a great success.

Lack of access to area like Rajamalwatta, Dematagoda, Maligawatta, &c., prevents the proper scavenging and disposal of refuse. The sanitation of these areas cannot be improved unless and until access is provided by means of roads and lanes.

Workable yet adequately comprehensive by-laws efficiently to control the many eating-houses and tea boutiques which cater to the public and the preparation and sale of articles of food such as ice-cream, sweetmeats, &c., are necessary. Where possible town water service should be extended and all drinking water wells abolished as nearly all of them are liable to contamination. Contaminated bathing wells should also be abolished or regularly chlorinated at the owners' expense.

Finally, protective vaccination against typhoid should be more largely availed of by the public. Its protective value was fully proved during the Great War, and it is a pity that even the more educated classes of the community do not make better use of such a valuable prophylactic agent. Every effort is being made by this Department to popularize protective inoculation. During 1929, 85 anti-typhoid inoculations were performed at the Municipal Dispensaries and Municipal Laboratory.

XVI.—CONTINUED FEVER.

Total number of cases reported during 1929 was 230, but exclusive of port and outside cases there were 132 town cases, as against 127 in the previous year with 34 deaths.

Reference to Spot Map II. shows that the distribution of continued fever cases closely resembles the distribution of typhoid fever. This parallelism year after year cannot be accidental. It would not be wrong therefore to regard the majority of the fatal cases of so called continued fever as really undiagnosed cases of typhoid fever. On the other hand a large number of these so-called continued fever cases must be regarded as due to influenza or other unrecognized causes.

XVII.—PULMONARY TUBERCULOSIS.

(Phthisis pulmonalis-consumption.)

1,313 cases with 593 deaths were reported during the year, of which 7 were from port, 404 from outside city limits, and 902 town cases as compared with 910 town cases last year.

The number of deaths was 593.

Statement (37) shows the incidence by race and sex and Statement (38) the distribution by wards.

(37) *Phthisis during 1929, by Race and Sex.*

Number of Town Cases.

Race.	Males.	Females.	Total.	Race.	Males.	Females.	Total.
Europeans ...	3	—	3	Malays ...	10	12	22
Burghers ...	29	21	50	Others ...	23	4	27
Sinhalese ...	249	272	521				
Tamils ...	115	43	158	Total ...	489	413	902
Moors ...	60	61	121				

(38) *Incidence of Phthisis during 1929, by Wards.*

Ward.	No. of Cases.	Ward.	No. of Cases.
Fort ...	2	Bambalapitiya ...	6
Pettah ...	4	Timbirigasyaya ...	12
San Sebastian ...	36	Wellawatta ...	16
St. Paul's ...	51	Prisons ...	3
Kotahena ...	79	Vagrants and paupers ...	23
Mutwal ...	72	Untraced ...	327
New Bazaar ...	79		
Maradana North ...	52	Total town ...	902
Maradana South ...	37	Port ...	7
Dematagoda ...	41	Beyond limits... ..	404
Slave Island ...	39		
Kollupitiya ...	12	Grand total ...	1,313
Cinnamon Gardens ...	11		

XVIII.—INFLUENZA.

Influenza is not a notifiable disease; its prevalence in the city has therefore to be inferred by the number of cases seeking treatment at the seven Municipal dispensaries.

Statement (39) shows the number of cases treated at each of the dispensaries during the year under review.

Naturally the largest number of cases occur during the wet months of the year when there is more exposure to influences of weather and more crowding together.

447 deaths were recorded as due to this disease during the year.

(39) *Influenza Cases reported from Municipal Dispensaries during each Month of the Year 1929.*

Month.	Slave Island.	St. Paul's.	Maradana.	Mutwal.	New Bazaar.	Wellawatta.	San Sebastian.	Total.
January ...	182	34	126	46	67	23	115	593
February ...	121	26	97	56	65	16	69	450
March ...	130	191	111	65	48	11	42	598
April ...	90	121	53	46	33	8	72	423
May ...	75	115	82	38	39	12	64	425
June ...	182	345	170	158	25	13	77	970
July ...	152	317	180	107	56	17	90	919
August ...	114	230	84	99	59	13	110	709
September ...	119	176	67	79	56	16	59	572
October ...	100	254	128	46	40	6	68	642
November ...	104	81	143	82	47	9	80	546
December ...	191	78	62	96	30	17	133	607
Total ...	1,560	1,968	1,303	918	565	161	979	7,454

XIX.—PNEUMONIA.

Pneumonia caused 1,150 deaths during the year as compared with 1,184 in 1928.

It is the principal cause of death in Colombo and has been so for many years. Its incidence however cannot be studied as it is not a reportable disease, and it is much to be regretted that the suggestion that it be added to the list of notifiable diseases has not been acted upon.

Pneumonia, I am afraid, will continue to take a high toll of human lives so long as housing conditions of the poor remain what they are.

(40) *Deaths from Pneumonia during 1929 by Race—Expressed as a Percentage of Total Number of Deaths.*

Race.	No. of Deaths.	Percentage of Total No. of Deaths.
All Races ...	1,150	13·8
Europeans ...	2	3·9
Burghers ...	48	13·9
Sinhalese ...	661	14·1
Tamils ...	223	14·4
Moors ...	122	10·4
Malays ...	19	·9
Others ...	75	27·4

(41) *Deaths from Pheumonia during 1929—Monthly Mortality.*

Month.	No. of Deaths.	Month.	No. of Deaths.	Month.	No. of Deaths.
January ...	99	June ...	113	November ...	90
February ...	104	July ...	115	December ...	88
March ...	132	August ...	105		
April ...	86	September ...	72	Total ...	1,150
May ...	76	October ...	70		

XX.—WHOOPING COUGH.

Whooping cough was made notifiable as from January 1, 1929. This Department is now in a better position to warn school authorities of infection among their pupils and to prevent children in an infective stage from going to school.

Last year there were reported 76 cases, of which 17 were extra-urban and 59 urban cases.

There were 4 deaths registered all among the town cases.

The majority of cases occurred among the children.

XXI.—EXPENDITURE—1929.

Head of Expenditure.	Estimated Expenditure.		Actual Expenditure.		Savings.		Excess.	
	Rs.	c.	Rs.	e.	Rs.	c.	Rs.	c.
1. Higher Staff ...	59,692	48	58,841	60	850	88	—	—
2. Clerical Staff...	22,536	0	22,530	0	5	82	—	—
3. Sanitary Branch	188,431	52	180,980	85	7,450	67	—	—
4. Dispensaries ...	92,726	0	78,053	55	14,672	45	—	—
5. Markets ...	42,518	0	41,678	87	839	13	—	—
6. Cemeteries ...	25,243	0	24,634	46	608	54	—	—
7. Laboratory ...	43,481	0	43,364	58	116	42	—	—
8. Laundries ...	3,500	0	2,999	61	500	39	—	—
9. Child Welfare	63,972	0	61,139	0	2,833	0	—	—
10. Health Education Propaganda...	2,000	0	2,019	74	—	—	19	74
Total	544,100	0	516,242	44	27,877	30	19	74

XXII.—GENERAL SANITATION.

Statements (42) and (43) give details of the work done during the year by the Ward Inspectors.

An increase of work compared with the previous year is shown under several headings.

(42) *Statement of Prosecutions and Convictions during the Year 1929.*

Ordinance or By-law.	Offence.	No. of Prosecutions.	*No. of Convictions.
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy premises	...	1014	904
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy dairy	...	45	46
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy laundry	...	3	10
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy poultry stall	...	3	2
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy cattle shed	...	2	3
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy aerated water factories	...	5	5
Section 1, sub-section (4), of Ordinance No. 15 of 1862 : Nuisance by cattle, swine, &c.	...	28	42
Section 1, sub-section (9), of Ordinance No. 15 of 1862 : Selling unwholesome food	...	7	7
Section 53 of Ordinance No. 1 of 1896 : Unregistered laundry	...	47	33
Regulation 89 made under section 4 of Ordinance No. 3 of 1897 : Storing rice in unauthorized places	...	41	38
Section 5 of Ordinance No. of 1897 : Failure to fill up wells	...	1	1
Section 110 of Ordinance No. 6 of 1910 : Spitting in public places	...	7	4
Section 178 of Ordinance No. 6 of 1910 : Failure to limewash	...	86	82
Section 180 of Ordinance No. 6 of 1910 : Failure to fill swampy lands	...	5	5
Section 184 of Ordinance No. 6 of 1910 : Committing nuisance	...	17	18
Section 190 of Ordinance No. 6 of 1910 : Failure to provide privy accommodation	...	16	11
Section 205 of Ordinance No. 6 of 1910 : Failure to report infectious disease	...	19	15
Section 212 of Ordinance No. 6 of 1910 : Unlicensed offensive trades	...	3	4
Rule 1, chapter VII., Municipal by-laws : Burying in unregistered burial ground	...	1	—
Rule 29, chapter VIII., Municipal by-laws : Digging pits and wells without permission	...	2	1
Rule 31, chapter VIII., Municipal by-laws : Failure to provide dust bins	...	12	14
Rule 4, chapter IX., Municipal by-laws : Filthy bathing place	...	10	9
Rule 31, chapter IX., Municipal by-laws : Failure to properly dispose of rubbish	...	10	4
Rule 1, chapter XI., Municipal by-laws : Unlicensed eating-house	...	124	95
Rule 1, chapter XI., Municipal by-laws : Unregistered bakeries	...	—	1
Rule 2, chapter XI., Municipal by-laws : Unlicensed tea boutiques	...	1	1
Rule 7, chapter XI., Municipal by-laws : Filthy eating-house	...	99	99
Rule 7, chapter XI., Municipal by-laws : Filthy bakery	...	35	31
Rule 8, chapter XI., Municipal by-laws : Unclean workmen in bakery	...	12	14
Rule 3, chapter XIII., Municipal by-laws : Disorderly conduct in public markets	...	66	54
Rule 10, chapter XIII., Municipal by-laws : Filthy private stall	...	6	1
Rule 28, chapter XIII., Municipal by-laws : Throwing rubbish in market	...	26	26
Rule 29, chapter XIII., Municipal by-laws : Filthy market stall	...	43	41
Rule 31, chapter XIII., Municipal by-laws : Failure to serve public in stall	...	1	1
Rule 34, chapter XIII., Municipal by-laws : Obstruction of passages in public markets	...	210	199
Rule 39, chapter XIII., Municipal by-laws : Keeping cattle in excess of number allowed	...	22	19
Rule 2, chapter XIV., Municipal by-laws : Exposing food to dust and flies	...	520	476
Rule 3, chapter XIV., Municipal by-laws : Sale of adulterated milk	...	186	164
Rule 4, chapter XIV., Municipal by-laws : Selling milk deficient in fat	...	6	6
Rule 5, chapter XIV., Municipal by-laws : Refusing Sanitary Inspectors sample of milk	...	5	5
Rule 7, chapter XIV., Municipal by-laws : Unregistered milk vendor	...	118	111
Total	...	2,864	2,602

* Includes convictions obtained on prosecutions instituted during the previous year.

(43) Work done by the Sanitary Staff during the Year 1929.

Nature of Work.		Fort.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	Mutwal.	New Bazaar.	Maradana North.	Maradana South.	Dematagoda.	Slave Island	Kollupitiya.	Cinnamon Gardens.	Bambalapitiya.	Timbiriagasaya.	Wellawatta.	Total.
1. Number of inspections	...	7,909	7,634	6,354	6,842	6,510	8,367	8,165	7,946	8,544	8,397	3,838	5,477	6,108	4,112	5,407	6,598	108,208
2. Number of premises where sanitary defects were found :—	...	32	322	200	477	133	111	290	206	337	264	204	315	82	87	184	200	3,444
(a) Non-structural	...																	
3. Number of premises where sanitary defects were found :—	...																	
(b) Structural	...																	
4. Number of premises where non-structural defects were rectified...	...	25	62	32	80	51	66	87	49	30	12	92	20	12	38	75	31	762
5. Number of premises where minor structural defects were rectified.	...	23	189	164	295	99	97	224	118	228	226	203	168	76	97	216	94	2,517
6. Number of buildings, other than dwellings, structurally improved.	...	7	19	23	75	57	41	62	31	14	13	78	8	12	32	47	24	543
7. Number of insanitary premises scavenged by Public Health	...	14	15	—	—	—	—	20	3	2	—	—	24	—	14	19	—	111
Department Cleansing Gang	...																	
8. Number of dwellings disinfected	...	—	58	61	67	114	1,359	227	1,645	142	1,749	204	70	11	94	40	27	5,868
9. Number of dwellings linewashed	...	4	18	126	68	261	—	201	153	119	164	265	133	53	61	42	108	1,776*
10. Number of wells filled up	...	24	315	835	1,882	361	163	1,111	384	716	162	1,001	383	78	91	127	211	7,844
11. Number of cesspits filled up	...	—	—	—	1	2	—	1	—	—	2	1	7	—	1	2	2	19
12. Number of notices served under section 1, sub-section (1), of Ordinance No. 15 of 1882. (Filthy premises)	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13. Number of notices served under section 190 of Ordinance No. 6 of 1910. (Privy accommodation)	...	4	50	92	152	116	28	148	113	98	73	72	61	17	26	56	53	1,159
14. Number of notices served under section 180 of Ordinance No. 6 of 1910. (Filling up stagnant pools, &c.)	...	—	—	1	1	4	3	9	12	3	3	1	4	—	3	5	9	58
15. Number of notices served under section 178 of Ordinance No. 6 of 1910. (Cleansing and linewashing)	...	—	—	—	—	2	—	—	1	—	3	—	3	—	2	—	10	21
16. Number of notices served under by-law 8 (1), chapter 22, Plague Regulations. (Improvements to buildings unfit for human habitation)	...	24	211	140	218	39	5	97	31	78	20	97	41	—	11	22	9	1,043
17. Number of notices served under section 38, Part I., of Plague Regulations. (Filling up wells)	...	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
18. Number of milk samples taken under rule 5, chapter 14, Municipal by-laws	...	—	—	—	—	—	—	1	—	—	—	2	1	—	—	2	—	6
19. Number of prosecutions	...	72	72	72	72	72	72	72	72	72	78	72	73	72	72	72	72	1,159
20. Number of convictions	...	38	217	239	196	191	98	277	184	231	175	379	200	106	59	129	145	2,864
21. Number of cases acquitted, withdrawn, or otherwise dealt with...	...	28	208	227	196	167	96	233	174	196	158	369	177	85	54	114	120	2,602
22. Number of cases pending at end of year	...	3	12	6	15	23	8	35	6	16	13	23	15	6	—	8	14	202
	...	2	1	2	8	10	3	9	8	19	3	8	11	3	5	3	1	96
23. Amount of fines ...	...	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
	...	550'50	2,175'50	2,039	1,837	1,320	894'50	1,798'50	1,360	1,427	1,535'50	2,744	1,820	839	712	1,155	883	23,090'50

* For number of dwellings disinfected by Plague staff, *vide* Statement (25).

XXIII.—FOOD INSPECTION.

There is only one whole-time Food Inspector for the whole city. A great deal more work could be done if we had an Inspector for each of the two divisions of the town.

The work done by the Food Inspector is shown in Statement (44) (a).

Under our existing by-laws beyond destroying such articles of cooked food as rice and curry, fried fish, boiled eggs, sweetmeats, &c., which are unfit for consumption no charge can be framed against the vendor for selling to the public food unfit for human consumption.

A new set of by-laws for bakeries and eating houses were made by the Municipal Council under sections 109 and 110 of the Municipal Councils Ordinance, 1910, and were proclaimed in 1929. These by-laws were urgently needed and would have given this Department better sanitary control over these establishments which at present are a menace to the public health. Owing however to the great volume of opposition raised they have not been put in operation, and Council is now engaged in considering the amendment of the conditions and regulations governing these establishments.

Of the 109 samples of milk taken by the Food Inspector no less than 65 or 59·6 per cent. of them were found to have been adulterated, and although this figure is an improvement over the previous year yet it is still very high.

As a result of representations made to the Excise Department in regard to the presence of copper in arrack the amount of this metal has now been reduced to very near the permissible amount, namely, 0·25 grains per gallon.

Statement (44) (b) shows the work done by Ward Inspectors in respect of inspection and destruction of foodstuffs.

(44) *Foodstuffs condemned during the Year 1929.*

(a) By the Food Inspector.

In the Municipal Markets.

Fish	...	...	804 $\frac{3}{4}$ lb.
Meat	...	...	491 $\frac{3}{4}$ lb.
Fruit and vegetables	...	...	420 $\frac{1}{2}$ lb.

In Private Markets in the Town.

Fish	...	...	225 $\frac{1}{4}$ lb.
Meat	...	...	95 $\frac{1}{2}$ lb.
Fruit and vegetables	...	...	386 lb.
Dry Fish	...	...	13 $\frac{1}{2}$ lb.
Cheese	...	...	18 lb.
Sweetmeats	...	...	200 lb. and 26 plates.
Tinned food	...	...	217 tins.
Stale curries	...	...	36 dishes.
Stale boiled rice	...	...	4 pots.
Boiled eggs (putrid)	...	...	12
Soup	...	...	1 pot.
Fried fish	...	...	7 dishes.

(b) Ward Inspectors.

At the Customs	...	...	Nil.
At the Chalmers granaries	...	...	Rice 99 $\frac{3}{4}$ bushels.

In the Municipal Markets.

Fish	...	...	60 $\frac{1}{2}$ lb.
Beef	...	...	1 cwt. 62 lb.

In Private Markets in the Town.

Potatoes	...	...	6 tons 3 cwt. 12 lb.
Sweetmeats	...	...	12 lb.
Rice	...	...	365 $\frac{3}{8}$ bushels.
Dhal	...	...	80 lb.
Flour	...	...	5 cwt. 96 lb.
Onions	...	...	1 ton 10 cwts.
Dates	...	...	20 lb.

(45) *Food Trades Inspections during the Year 1929.—Number of Inspections made.*

Ward.	Bakeries.	Dairies.	Eating-houses.	Public Markets.
Fort	79	—*	264	—†
Pettah	260	—*	858	148
San Sebastian	50	—*	730	405
St. Paul's	251	591	320	57
Kotahena	235	236	247	78
Mutwal	172	211	119	141
New Bazaar	242	341	460	—†
Maradana North	171	299	649	—†
Maradana South	149	4	1,019	116
Dematagoda	108	144	422	—†
Slave Island	100	76	199	120
Kollupitiya	126	215	328	189
Cinnamon Gardens	74	446	348	150
Bambalapitiya	108	167	206	122
Timbirigasyaya	62	214	202	—†
Wellawatta	137	187	292	124
Total	2,324	3,131	6,663	1,650

* No dairies in these wards.

† No public markets in these wards.

XXIV.—MARKETS.

A new market for the Mutwal Ward was opened at Mutwal street on August 1, 1929, bringing the total number of Municipal markets up to 13, six of which are built on modern lines.

The older ones, especially the ones at St. John's road, Gasworks street, and Kacheheri road are worse than ever, being dreadfully overcrowded and consequently dirty and uncomfortable both to the traders and customers.

The proposal to build a central market has not materialized yet. Negotiations, I believe, are still going on with Government over the question of site.

A new market for the Dematagoda-Kolonnawa area has been sanctioned and will probably be constructed during the course of the year.

A site for a market at Urugodawatta has also been selected and it is hoped that funds will be available for building it in 1931.

XXV.—DAIRIES AND MILK SUPPLY.

Nine dairies were discontinued and three new ones were registered during the year bringing the total number of dairies at the end of the year to 55 as compared with 61 at the end of 1928.

Dairies—Number of Convictions, 1929.

Offence.	No. of Convictions, 1928.	No. of Convictions, 1929.
Adulteration of milk ...	77	101
Excess cattle ...	16	19
Unclean dairy ...	41	46
Selling milk without card ...	110	111
Total ...	244	277

Milk Supply.—The supply of milk is still inadequate for the need of the city, the quality on the whole is poor, and the price of good milk is beyond the means of the working classes.

Reference is requested to the City Analyst's report on the subject annexed.

(46) *Milk Sampling during the Year 1929.*

Statement showing the number of samples adulterated with water up to 10 per cent. and above 10 per cent.

Source of Samples.	By Ward Inspectors.						By Food Inspector.				All Adulterations.		
	1 to 10 per Cent. Water.			Above 10 per Cent. Water.			1 to 10 per Cent. Water.		Above 10 per Cent. Water.				
	Number of Samples taken.	Number of Samples adulterated.	Percentage of Samples adulterated.	Number of Samples adulterated.	Percentage of Samples adulterated.	Number of Samples taken.	Number of Samples adulterated.	Percentage of Samples adulterated.	Number of Samples adulterated.	Percentage of Samples adulterated.	Total Number of Samples taken.	Number of Samples adulterated.	Percentage of Samples adulterated.
Town dairies ...	846	233	27.5	73	8.6	65	17	26.2	28	43.1	911	351	38.5
Unregistered vendors ...	113	22	19.5	58	49.0	38	6	15.9	28	73.7	151	114	75.5
Dairies outside Colombo ...	199	56	28.1	14	7.0	6	3	50	1	16.7	205	74	36.1
Total ...	1,158	311	26.9	145	12.5	109	26	23.9	57	52.3	1,267	539	42.5

Owing to prevalence of rinderpest in Colombo during practically the whole year, the members of the Dairy Branch of the Colombo Ladies' League suspended their visits to the dairies, and therefore no competitions were held for the usual certificates, cups, medals, &c.

XXVI.—BAKERIES.

Two bakeries were discontinued during the year and no new bakeries were registered.

The number at the end of the year was 54, and of these 27 were involved in prosecutions and 45 convictions were obtained for the following offences :—

Offence.	No. of Convictions.
Unclean bakery ...	31
Unclean workmen in bakery ...	14
Total ...	45

The bakeries remain much the same.

The new Bakery By-laws, which were proclaimed in November, 1929, but have not been put in operation yet owing to the opposition of those who are against any change whatever, would materially improve our bakeries and ensure that bread is produced under wholesome conditions. There is still much room for improvement both in the structural arrangements and in the standard of cleanliness. There is not a single bakery in Colombo that could be graded as a first class bakery.

The following is an extract from the report of the Bakery Branch of the Colombo Ladies' League :—

“Of the 46 bakeries regularly visited during the year, 39 having scored over 70 per cent. of marks are therefore eligible for awards, but 14 Municipal convictions reduce the number of bakeries eligible for awards to 32.

“No visits were paid as usual in April, May, and December, and as riots in January prevented us from completing our visits in that month, the marks are calculated on the results of eight monthly visits.

“*The Challenge Cup* was contested for by 10 gold medalists, and A. J. de Mel won it with an average of 97 per cent. of marks. The bronze medal was secured by W. D. John Singho with 96 per cent. Every competitor scored over 75 per cent.

“‘*A*’ *Division* There were only 3 competitors, all with over 70 per cent. of marks. The gold medal has been won by F. A. D. Victoria with a score of 87 per cent.

“‘*B*’ *Division* shows an improvement over last year, as out of 33 bakeries only 7 scored less than 70 per cent. D. L. Saranapala wins the silver medal with 99 per cent., a bronze medal being awarded to M. A. M. Careem who comes second with 88 per cent. A. P. Perera is placed third with 86 per cent.”

XXVII.—EATING-HOUSES AND TEA BOUTIQUES.

Seventy-four eating-houses were discontinued and 28 new ones were registered during the year leaving a total of 594 as compared with 640 at the end of 1928.

The following convictions were obtained during the year :—

Offence.	No. of Convictions.
Exposing food to dust and flies ...	631
Unclean eating-house ...	99
Unlicensed eating-house ...	95
Selling unwholesome food ...	41
Total ...	866

The set of by-laws passed on October 26, 1928, were amended and relaxed during 1929 in response to the strong opposition created by those affected and the new set of by-laws proclaimed on November 25, 1929, were to come into operation as from January 1, 1930, but owing to continued opposition to even these by-laws the matter is receiving further consideration by the Council.

Unless and until the very large number of so-called “tea boutiques,” which sell all manner of comestibles other than cooked rice, is brought under proper supervision and control it would be impossible to ensure the cleanliness or wholesomeness of the food prepared and sold to the public at these establishments.

XXVIII.—LAUNDRIES.

(a) *Public Laundries*

No new laundries were constructed during the year.

The proposed laundry for New Bazaar Ward has to await the completion of the housing scheme for those who will be dehouseed from the site selected for the laundry in Armour street.

(b) *Private Laundries.*

Nineteen were discontinued and 24 new ones registered during the year, making a total of 284 as compared with 279 at end of 1928.

These private laundries are all unsatisfactory, but they must be tolerated until such time as the city is completely served by the requisite number of Municipal laundries.

XXIX.—LAVATORIES.

(a) *Public Lavatories.*

During the year 2 new public lavatories were opened at Mutwal and Fishers quarters, two very congested areas, bringing the total number of public lavatories to 68.

The money spent upon these buildings has been excellently invested. They have tended not only to improve the general sanitary condition of the areas in which they have been located but also markedly to lessen the incidence of typhoid fever in the city. (See Section XV. on typhoid fever and Diagram IV.)

I am glad to be able to report that at long last Galle Face is to have a public lavatory and funds for its construction have been provided in the Budget for 1930:

The question of replacing the very odoriferous one along side the Y.M.C.A. by a new one near the Echelon barracks is also receiving attention.

Another suggestion that I am pleased to see has materialized is the conversion of a suitable spot on the sea front at the end of Kinross avenue, Bambalapitiya, into a safe place for sea-bathing. With the expenditure of a comparatively small sum of money Council has been able to afford thousands of people not only pleasure and healthy open air recreation but an opportunity to learn to swim and perhaps some day be able to save a life from drowning.

(b) *Private Lavatories.*

The Aided Drainage System of Council introduced in May, 1923, has resulted in a more rapid conversion of pail latrines into water closets (see Diagram IV). Out of a total of approximately 21,800 separately assessed premises in the city, 7,794 premises have now been drained. During the year 963 earth closets were abolished and 1,739 water closets installed.

XXX.—MOSQUITO PREVENTION.

There is nothing new to write under this head. The draft Ordinance is still with Government and has not been passed into law yet.

The question of malaria in Colombo is now under investigation and as the inquiries are not complete no reference will be made to it in this report. Mosquitoes in Colombo, even if they are not a danger, are a source of great annoyance and irritation. Sleep is impossible except under mosquito nets, and in the muggy climate of Colombo those who cannot afford the luxury of an electric fan must either grill under a mosquito net or be kept awake all night. This unfortunate state of affairs could be easily remedied if each householder would do his bit in respect of his own premises, but in this world there are many people who will not do their simple duty till they are threatened with the law and so long as there is no law this pest will continue to be a source of annoyance, discomfort, loss of sleep, irritability, and ill health.

(47) *Anti-Mosquito Work, 1929.*

Complaints from Householders.

Number of complaints	...	...	...	552
Number of premises visited	...	...	...	1,853
Number of potential breeding places found	...	...	...	24,011
Number of actual breeding places found	...	...	...	6,523

General Inspection Work.

Number of premises visited	...	...	...	1,257
Number of tenements visited	...	...	...	451
Number of potential breeding places found	...	...	...	27,407
Number of actual breeding places found	...	...	...	3,368

XXXI.—DISINFECTING AND CLEANSING.

Work done in this respect is shown in the following statement:—

(48) *Disinfecting and Cleansing.*

	1928.	1929.
(a) Number of van-loads of clothing &c., disinfected	... 153	... 159
(b) Number of articles included in above	... 3,082	... 5,321
(c) Number of premises cleaned up by Municipal Cleansing Gang	... 5,693	... 5,868
(d) Number of dwellings disinfected	... 9,233	... 11,147
(e) Number of dwellings pesterined	... 9,344	... 7,450
(f) Number of dwellings claytonized	... 16,885	... 17,199
(g) Number of dwellings unroofed	... 16,885	... 17,199
(h) Number of limewashing notices served	... 800	... 2,043
(i) Number of dwellings limewashed by owners or dwellers	5,409	... 7,844

XXXII.—HOUSING.

The work done by the Inspector of Insanitary Buildings is shown in Statements (49) and (50).

A total of 62 premises were improved, as against 42 in the previous year. They were situated in the following wards:—

Ward.	No. of Premises improved.	Ward.	No. of Premises improved.
Slave Island	... 11	Pettah	... 2
Maradana North	... 10	Bambalapitiya	... 2
New Bazaar	... 9	Kollupitiya	... 1
St. Paul's	... 7	Kotahena	... 1
Dematagoda	... 7	Wellawatta	... 1
San Sebastian	... 5		
Maradana South	... 3	Total	... 62
Timbirigasyaya	... 3		

The question of housing is still to a great extent an unsolved problem. The high incidence of phthisis, pneumonia, and chickenpox shows the great danger of overcrowding in unsuitable houses.

In my report for 1927 I indicated the lines on which action might be taken, and to-day I am more convinced than ever that the problem could be solved by working more or less on those lines.

First, the Government and the Municipality should provide decent housing for all its labour. Then private employers of labour forces, exceeding, say, 100 in number, should be called upon, or in default compelled by legislation, to provide decent housing for their workmen. Over a 1,000 cases of chickenpox occurred last year, and the great majority of these cases was due to direct contact infection in the crowded chunmeries occupied chiefly by immigrant labourers employed by various private firms. The cost of removal, feeding, and maintenance of the large number of patients and of contacts must be considerable and falls upon the Government and Municipality, and a considerable part of this sum could be saved if these private labour forces were properly housed. Under the present conditions a single house with two or three rooms is occupied by 20 to 30 or more men, and a case of chickenpox breaking out in one of these places means that all the occupants of the house go down with it sooner or later and must be removed to the Infectious Diseases Hospital and maintained there for the full infective period at the cost of the ratepayer.

Employment offered by these firms attracts labour from India, and the slum areas of the city are getting more crowded every year. There is plenty of undeveloped land both within and just without the city and now that the problem of travelling has been to a great extent solved by the plying of 'buses there should not be any insuperable difficulty in devising suitable and cheap housing schemes for this class of people.

Colombo is a fast growing city. It must soon extend its present limits. The area to the south and east is growing in a more or less haphazard manner, and when these areas are some day included within the town we shall be faced with still greater problems of town planning, sanitation, drainage, road widening, &c., and the Council will have to spend vast sums of money in undoing and correcting mistakes that are now being made. This area should therefore receive attention before it is too late. Technical advisers of both the Government and Municipality should work together and town-plan this area and indicate the lines on which it should be developed so as not only to fit into the existing scheme of things in Colombo but also to ensure that the new areas will develop on sound and modern lines.

A little foresight and imagination now will save the country and the next generation vast sums of money. The present generation is now paying for the lack of foresight of the previous generation. The widening of the Colombo-Galle road for instance is costing the country a fortune. I wonder if the continuation of this same road beyond the city limits is receiving any attention, whether any street lines have been laid down and whether any action is being taken to prevent the erection of any buildings within the future street lines.

It is always a sound policy for a growing city to keep an eye on those areas outside and adjoining its own limits which are likely sooner or later to be included within its boundaries and to direct the proper development of those areas on correct lines.

(49) *List of Premises improved during 1929—By Wards.*

<i>Pettah.</i>	No. 3, Vincent street.	No. 48-50, Reservoir road.
No. 20, Mitcho's lane.	No. 76-77, Barber street.	No. 68-76, Reservoir lane.
No. 18, First Cross street.	No. 87-88, Ferry street.	<i>Slave Island.</i>
<i>San Sebastian.</i>	No. 79, Ferry street.	No. 14-18, Saunders court.
No. 10, Peer Saibo's lane.	<i>Maradana North.</i>	No. 48, Wekanda.
No. 101-102, Old Moor street.	No. 84/40-47, Piachaud's lane.	No. 60, Wekanda.
No. 20-21, Marties lane.	No. 98-100, Piachaud's lane.	No. 1-3, Kew patch.
No. 60, Dam street.	No. 85, Piachaud's lane.	No. 66-72, Vauxhall street.
No. 20, Dias place.	No. 86-90, Piachaud's lane.	No. 38, Vauxhall street.
<i>St. Paul's.</i>	No. 50, Piachaud's lane.	No. 10, Ferry lane.
No. 59, Chekku street.	No. 84/58-64, Piachaud's lane.	No. 1, New Station passage.
No. 3, Gintupitiya street.	No. 3, Driberg's lane.	No. 116, Vauxhall street.
No. 41, Siripina lane.	No. 84-94, Piachaud's lane,	No. 8-10, Ingham street.
No. 11-23, Hill street.	No. 84/21-28, 39, Piachaud's lane	No. 14-18, Leechman's lane.
No. 47, Wolfendahl.	No. 84/54-55, Piachaud's lane.	<i>Kollupitiya.</i>
No. 1, Brassfounder's street.	<i>Maradana South.</i>	No. 22, St. Michael's road.
No. 42, Wolfendahl street.	No. 1, Arab lane.	<i>Bambalapitiya.</i>
<i>Kotahena.</i>	No. 4-12, Arab lane.	No. 4, 9th Lane.
No. 28, Pickering's road.	No. 93, Dean's road.	No. 104-112, Laurie's road.
<i>New Bazaar.</i>	<i>Dematagoda.</i>	<i>Timbirigasyaya.</i>
No. 79-80, Silversmith street.	No. 18, Reservoir road.	No. 84, Buller's road.
No. 73-74, Barber street.	No. 120, Dematagoda.	No. 40/27-38, Buller's road.
No. 2, Vincent street.	No. 9, Clifton lane.	No. 84/1-10, Buller's road.
No. 16-19, Silversmith street.	No. 17-19, Temple road.	<i>Wellawatta.</i>
No. 5, Vincent street.	No. 48-62, Reservoir lane.	No. 8, Frederica road.

(50) *Statement of Work done by the Inspector of Insanitary Buildings during the Year 1929.*

1. Number of plans called for from Municipal Engineer...	...	67
2. Number of plans received	...	83
3. Number of applications for "closing order"	...	78
4. Number of "closing orders" issued	...	78
5. Number of applications for "closing order" struck off, laid by, withdrawn, &c.	...	—
6. Number of applications for "closing order" pending	...	42
7. Number of prosecutions for allowing premises to be occupied after "closing order"	...	38
8. Number of closing notices affixed on buildings	...	952
9. Number of premises vacated after "closing order"	...	1
10. Number of tenements vacated under (9) above	...	9
11. Number of persons dishoused	...	39
12. Number of premises improved	...	63
(a) Number of tenements in (12)...	...	1,145
(b) Number of rooms demolished in (12)	...	349
(c) Number of persons dishoused in (12)	...	535
(d) Number of new doors provided in (12)	...	148
(e) Number of new windows provided in (12)	...	700
(f) Number of doors enlarged in (12)	...	643
(g) Number of windows enlarged in (12)	...	151
(h) Number of rooms cemented in (12)	...	1,695
(i) Number of masonry partitions removed in (12)	...	277
(j) Number of plank partitions removed in (12)	...	13
(k) Number of gunny partitions removed in (12)	...	1
(l) Number of rooms in which masonry walls have been replaced by trellis in (12)	...	641
(m) Space unroofed square feet in (12)	...	—
(n) Length of roof raised (in feet)	...	7,512
13. Amount of fines for (7)	...	657'50

XXXIII.—MUNICIPAL FREE DISPENSARIES.

The St. Paul's Ward Dispensary which was located in a rented building in Barber street was moved, as originally intended, into the building constructed for the purpose in the premises occupied by the War Memorial Child Welfare Centre, and the dispensary which was opened there in August, 1928, exclusively for women and children was moved into San Sebastian's Ward and converted into a general dispensary for both sexes. By this move San Sebastian's Ward, which is a poor and congested area, has obtained a general dispensary within its own limits.

All dispensaries continue to be well patronized and have proved themselves to be a great boon to the poor of the districts in which they are located.

Out of the seven dispensaries, two are now located in suitable buildings owned by the Council. The other five are in unsuitable rented buildings. Council has sanctioned, and the work of construction will begin this year of a dispensary and child welfare centre for Slave Island Ward. If funds permit the next one should be built in Modera for the Mutwal Ward, where work is carried on under difficulties owing to inadequate space.

(51) *Work done at the Municipal Dispensaries during 1929.*

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
	Slave Island Dispensary.	St. Paul's Dispensary.	Maradana Dispensary.	Modera Dispensary.	New Bazaar Dispensary.	Wellawatta Dispensary.	San Sebastian Dispensary.
Number of patients treated ..	18,020	10,796	14,158	14,342	8,821	8,198	9,467
Number of visits by patients	34,410	20,541	25,165	24,513	16,791	17,244	13,793
Daily average attendance ...	111	66	81	80	55	56	44
Number of outdoor visits paid by the Medical Officer ...	91	52	61	232	10	43	—
Number of cases sent in by Health Visitors' tickets ...	414	—	—	386	—	126	—
Number of labour cases in which medical or surgical aid was rendered ...	—	15	—	9	—	1	—
Number of Municipal employees treated ...	310	—	92	6	148	228	48
Number of subjects inoculated against typhoid ...	—	38	—	3	—	—	17

XXXIV.—MATERNITY AND CHILD WELFARE.

Dr. (Mrs.) M. Lakshmiamma, M.B., C.M. (Glasgow), was appointed to the post of Medical Officer, Maternity and Child Welfare, on April 1, 1929, but resigned from the service on November 30, 1929, and Dr. M. J. Fernando, a private practitioner, was appointed to carry on the work. These unfortunately frequent but unavoidable changes in the staff have been, I am afraid, rather detrimental to the progress of this work.

Miss Linda Wambeek, a fully qualified general and maternity nurse, who was sent to England in 1928 on funds generously provided by a public spirited Sinhalese lady, returned to Ceylon after a full course of training in Public Health Nursing at the Bedford College for Women,

London, and a practical course at Birmingham, and was appointed Superintending Health Visitor on January 20, 1929. It is hoped to introduce as soon as possible the Birmingham system of visiting and of keeping records with slight alterations to suit local conditions.

It is a matter for gratification that section 57 of chapter VIII. of the Medical Ordinance, No. 26 of 1927, will be enforced in Colombo as from July 1, 1930, after which date anyone practising as a midwife in the city of Colombo without being registered as such by the Ceylon Medical Council will be prosecuted and will be liable to a fine of Rs. 200.

A census taken of all midwives practising in the city disclosed the fact there were 46 unqualified women openly practising as midwives. As to the number of so called "handy women" who assist at these functions it is impossible to ascertain their number. The unqualified midwives were summoned before a Board consisting of the Registrar of the Medical Council, the Medical Superintendent of the Lying-in Home, and the Medical Officer of Health, Colombo, with a view to ascertaining—

- (a) How many of them were unfit by reason of advanced age or physical infirmity to continue to practise as midwives ;
- (b) How many of them were willing to undergo the 6 months free course of instruction at the Lying-in Home as provided in the regulations made under section 16 of Ordinance No. 26 of 1927 ;
- (c) How many of them could produce satisfactory evidence of possessing sufficient knowledge and skill for efficient practice as a midwife as required by section 54 (1) (d) of chapter VIII. of Ordinance No. 26 of 1927.

Eleven out of the 46 came under category (a) above and were warned to discontinue practice on pain of action under the Ordinance. They were obviously a danger to society. Only one woman expressed a desire to take advantage of the free course at the Lying-in Home ; the others were not willing to undergo training, but the majority of them said they were able to produce satisfactory evidence from qualified medical practitioners as to their knowledge and skill for efficient practice as required by section 54 (1) (d). They were directed to do so and get themselves registered on or before July 1, 1930, after which date action would be taken against all unregistered women practising as midwives in the city.

The work of all midwives in the city will be under the control and supervision of a local supervising officer as required by regulation 2 made under section 58 of Ordinance No. 26 of 1927. The Council at its meeting held on July 10, 1929, resolved that these duties should be performed by the Medical Officer, Maternity and Child Welfare, in addition to her own duties.

This measure which has been long overdue will, it is trusted, gradually eliminate all those dangerous creatures who, as "handy women" or professional midwives, contributed largely to the high maternal mortality rate of Colombo, which in the year under review was—

Rate per 1,000 births, all causes	...	26·3
Rate per 1,000 births, puerperal septicæmia	...	12·0
Rate per 1,000 births, all other causes	...	14·3

The high death-rate from puerperal septicæmia is undoubtedly due in a large measure to the baneful activities of these women. Colombo is well served by a large number of private qualified midwives and by 12 Municipal Midwives operating in the poor districts. The elimination therefore of the unqualified woman will in no way be a hardship to the poor residents of the town.

The supervision exercised over the midwives will have to be very careful and close, as even the qualified and trained women employed by the Council show a tendency sometimes to be careless about aseptic measures. The germ theory of disease is all moonshine to them, and they will practise aseptic methods only from fear of detection and punishment rather than from a due appreciation of its beneficent value.

Statement (52) shows the number of cases conducted by the Municipal Midwives during the year 1929.

Inche Juhary, the Muslim Midwife, did good work in the Slave Island Ward, conducting 236 cases for the year or an average of 20 cases a month. She would appear to be very popular among her own community and co-religionists.

Out of a total of 9,331 births in the city (673 of which were stillbirths), 3,483 births (3,075 live and 408 stillbirths) or 37·3 per cent. took place in the hospitals and 1,310 births (1,239 live and 71 stillbirths) or 14·0 per cent. were conducted by the 12 Municipal Midwives, and the balance 4,538 births or 48·7 per cent. of all the births were presumably conducted by private midwives, both qualified and unqualified.

The large percentage, namely, 37·3 per cent. of all births, delivered at the hospitals shows the popularity of and the need for such institutions in the city. A great many of the children born in the slum districts of the city are brought into the world under conditions most unfavourable both to themselves and their mothers. Clean midwifery is in many cases impossible in the dark, overcrowded, ill-ventilated, bedless chamber of a single or double roomed tenement, where the necessary linen or even facilities for washing are wanting, and it would be greatly to the advantage of the poorer women of the city and the improvement of the maternal mortality rate if more maternity homes were available in the city.

The De Soysa Lying-in Home is the only maternity hospital in Colombo. Its accommodation is wholly inadequate and it is situated in Maradana South Ward, a considerable distance from the crowded and populous districts of Mutwal, Kotahena, New Bazaar, St. Paul's, &c., which have, as Statement (55) shows, large numbers of births every year.

Free hospitals should always be located, if they are to serve their purpose to the best advantage, in those districts which are thickly populated by the working classes. It is, I believe, contemplated to extend the De Soysa Lying-in Home in the near future. It would be far more useful to provide small maternity homes in the crowded districts where the poor live, such

as Mutwal, Kotahena, New Bazaar &c., rather than enlarge the existing maternity hospital. These maternity homes need not be big, accommodation for 12 beds with necessary offices will be sufficient. They will be more popular and readily accessible to the people and could be made the centres for ante-and neo-natal work among the working classes.

The infant mortality rate last year was 201, which is a slight setback as compared with 1928 when it was 181. This was mainly due to an increased mortality from diarrhoeal diseases. Owing to the difficulty of getting a satisfactory supply of fresh milk, Lactogen is being given at the Gintupitiya centre from June. On an average about 50 babies are given dried milk and fresh milk every month at a cost of approximately Rs. 500 a month.

REPORT OF THE ACTING MEDICAL OFFICER, MATERNITY AND CHILD WELFARE, FOR 1929.

THE MEDICAL OFFICER OF HEALTH, COLOMBO.

I HAVE the honour to submit the work done during the year ending December 31, 1929.

I assumed duties on December 2, and whatever statistics hereinafter embodied in this report are from the records submitted to the head office by my predecessors, except for the month of December, 1929.

Previous to my taking office the duties of the Medical Officer were both preventative and curative, but now the curative portion is entrusted to the Medical Officers of the respective Municipal dispensaries, but the clinics for the ante-natal cases and children are held regularly at the various centres throughout the week and they are well patronized. The babies are regularly weighed at the centres where free food is distributed. The nature of the food distributed at the Gintupitiya centre is artificial, but at the other stations cow milk is supplied by the dairymen direct to their houses. It is difficult to have proper control as regards the purity of the milk or the regularity of supply, and I would suggest that either the system adopted at the Gintupitiya centre be carried out at other centres or cow milk is to be distributed under the supervision of a senior Health Visitor from the respective stations. This is urgently needed at Modera.

The present staff of Health Visitors number seventeen besides Miss L. Wambeek, who has had special training in England in Public Health Nursing. However great the numbers the annual statement by the Health Visitors shows as regards the number of houses visited, instructions given, and tickets issued, I consider the present number of Health Visitors is inadequate to give proper attention and spend sufficient time on health education at the homes.

The number of midwives is twelve. They need increase when the Maradana centre is opened. Their work throughout year had been satisfactory, it shows an improvement on the number of cases taken last year. The responsibility of Municipal Midwives at present is only till the case is delivered. This I consider very unsatisfactory, because the cases delivered by them are very poor and unless the midwife held responsible until the puerperium is over (even for a period of ten days) there is every likelihood of these cases turning septic and thereby increase the maternal mortality.

Lectures are regularly given to the Health Visitors and Midwives at the Child Welfare Centre, Gintupitiya.

The card system of home visiting as carried on by different health departments of England is to be introduced shortly, and will I feel sure be a great improvement on the present system.

In conclusion I have to thank the whole staff for the ready help rendered in carrying out my duties.

M. J. FERNANDO,

Acting Medical Officer, Maternity and Child Welfare.

(52) List of Cases conducted by Municipal Midwives, 1929.

Names of Midwives.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for Year.
Angelina Fernando ...	4	14	4	5	18	—	10	7	13	—	26	7	108
E. Direckze ...	18	8	—	14	8	4	17	2	1	—	8	—	80
D. B. Dias ...	13	9	11	7	16	14	5	7	9	4	6	11	112
M. R. Sathasivam ...	7	4	17	2	5	8	10	5	12	7	6	14	97
K. Cecilia Perera ...	8	7	17	1	4	13	6	9	—	10	2	4	81
J. A. M. P. Jayasinghe ...	7	7	6	3	7	9	4	5	6	25	20	5	104
N. Dharmaratne ...	11	16	8	7	19	5	—	3	11	12	5	7	104
D. M. Pallewala Hamine ...	12	11	16	15	6	8	9	10	9	15	18	27	156
J. Arul Mary ...	—	—	5	—	8	6	10	—	—	10	4	7	50
B. Rajapakse ...	—	2	8	5	10	6	6	4	8	7	9	10	75
P. Medline Perera...	20	9	7	15	—	9	8	19	8	5	5	2	107
Inche Juhary ...	21	24	17	16	15	12	22	22	18	23	26	20	236
Total ...	121	111	116	90	116	94	107	93	95	118	135	114	1,310

(53) *Work done by Health Visitors during 1929.*

Name.	No. of Houses visited.	Instructions <i>re</i> Infant Feeding.	No. of Tickets issued.	Municipal Midwives' Cases (visited).
Mrs. E. Raymond	... 11,136	... 2,181	... 191	... 18
Mrs. I. Zieseness	... 11,849	... 1,742	... 10	... 36
Mrs. A. Cruse	... 14,467	... 5,391	... 23	... 53
Mrs. I. Marsden	... 13,553	... 4,902	... 55	... 35
Miss L. G. Firth	... 15,333	... 5,004	... 292	... 141
Mrs. E. Meier	... 14,256	... 4,562	... 163	... 120
Miss E. Jansen	... 12,795	... 4,824	... 148	... 172
Mrs. V. Misso	... 10,299	... 4,097	... 98	... 54
Miss A. Schokman	... 14,036	... 5,045	... 76	... 104
Mrs. M. M. Samarasekera..	10,113	... 2,887	... 16	... 122
Mrs. M. S. Perera	... 11,826	... 1,233	... 31	... 103
Mrs. M. Fernando	... 10,350	... 4,589	... 33	... 30
Mrs. F. E. M. Harris	... 11,678	... 2,889	... 123	... 66
Mrs. M. John	... 9,899	... 2,657	... 30	... 161
Mrs. I. Ferdinand	... 16,173	... 6,134	... 113	... 77
Mrs. Martha Perera	... 9,980	... 5,017	... 75	... 49
Mrs. L. Earde	... 2,360	... 240	... 3	... 7

(54) *Statement of Expenditure on Milk supplied to Infants by the Child Welfare Branch during the Year 1929.*

Month.	No. of Bottles of Milk.	Cost of Milk. Rs. c.	Month.	No. of Bottles of Milk.	Cost of Milk. Rs. c.
January	... 1,243½	... 497 40	September	... 1,102	... 440 80
February	... 1,207	... 482 80	October	... 1,173	... 469 20
March	... 1,436	... 574 40	November	... 1,135½	... 454 20
April	... 1,450	... 580 0	December	... 1,293½	... 517 40
May	... 1,683	... 673 20			
June	... 1,124	... 449 60	Total	... 15,165	6,066 0
July	... 1,166½	... 466 60			
August	... 1,151	... 460 40			

(55) *Number of Births, Live and Still, 1929.—By Wards.*

1. New Bazaar	... 661	11. San Sebastian...	... 266
2. Slave Island	... 643	12. Timbirigasyaya	... 253
3. Mutwal	... 606	13. Bambalapitiya	... 160
4. Kotahena	... 598	14. Cinnamon Gardens	... 101
5. St. Paul's	... 565	15. Pettah	... 22
6. Maradana North	... 556	16. Fort	... 2
7. Dematagoda	... 507		
8. Wellawatta	... 325	Total Colombo Town	... 9,331
9. Kollupitiya	... 297		
10. Maradana South	... 286	Hospitals	... 3,483

XXXV.—STAFF CHANGES.

Higher Staff.—Dr. C. V. Aserappa, the Medical Officer of Health, returned from long leave on May 7, 1929, and relieved Dr. C. H. Gunasekara, the Chief Assistant, who was acting for him.

Dr. (Mrs.) M. Lakshmiamma was appointed to the post of Medical Officer, Maternity and Child Welfare, on April 1, 1929, when the acting officer, Dr. S. D. Fernando reverted to his post of Medical Officer, Modera Dispensary. Dr. Lakshmiamma resigned from the service on November 30, 1929.

Dr. M. D. Carolis assumed duties as Medical Officer, San Sebastian Dispensary, on March 1, 1929.

Child Welfare Branch.—Miss L. Wambeek, who was trained at Bedford College, England, as Public Health Nurse, assumed duties on October 1, 1929, in the Child Welfare Branch.

XXXVI.—BACTERIOLOGICAL LABORATORY.

Vide Annexure A for the Report of the City Microbiologist.

XXXVII.—ANALYTICAL WORK.

Vide Annexure B for the Report of the City Analyst.

Annexure A.

REPORT OF THE CITY MICROBIOLOGIST FOR 1929.

1.—LABORATORY.

A new electrically driven gas compressor and an incinerator for infectious material were installed during the year. Both are functioning efficiently.

(a) Distribution of Clinical Specimens.

				Examined for	Number Received.		Number Positive.
Diagnostic service for practitioners	...	{	Enteric	...	220	...	57
			Tuberculosis	...	169	...	44
			Dysentery	...	292	...	52
			Diphtheria	...	95	...	33
			Hookworm	...	135	...	51
			Malaria	...	44	...	2
			Various	...	338	...	213
Public Health Department	...	{	Enteric	...	582	...	13
			Human plague	...	20	...	4
			Tuberculosis	...	6	...	1
			Dysentery	...	12	...	5
			Diphtheria	...	103	...	20
			Hookworm	...	24	...	13
			Various	...	38	...	16
Veterinary Department	...	{	Anthrax	...	291	...	70
			Various	...	13	...	—
					<hr/>		<hr/>
					2,382		594

Of the 802 enteric specimens, 715 comprise finger blood for Widal's reaction, 12 blood cultures, 49 fæces, and 26 urines.

(b) General Distribution of Specimens examined during 1929.

Clinical specimens	...	...	...	2,382
Town water	...	...	...	188
Rat fleas for species distribution	...	...	...	9,185
Rodents for plague :—				
Port Commission	...	...	...	5,715
Veterinary Department	...	...	...	16,958
Public Health Department	...	...	...	1,936
Rodents for flea index :—				
Port Commission	...	...	...	349
Veterinary Department	...	...	...	3,250
Miscellaneous	...	...	...	85
				<hr/> 40,048

(c) Distribution of Rodents examined for Plague in 1929.

(1) By Mode of Capture.

		Species.	Number Examined.	Number Infected.	Percentage Infected.
Trapped rats	...	{ R. rattus	16,809	3	0'02
		{ R. norvegicus	4,286	1	0'02
		{ M. musculus	712	—	—
		{ Bandicoots	5	—	—
Rats found dead	...	{ R. rattus	46	2	4'35
		{ R. norvegicus	68	7	10'29
		{ M. musculus	1	—	—
Rats killed by fumigation	...	{ R. rattus	698	1	0'14
		{ R. norvegicus	1,363	8	0'59
		{ M. musculus	608	—	—
		{ Bandicoots	13	—	—
			24,609	22	0'09

(2) By Species and Source.

		Trapped Alive.			Found Dead.			Killed by Fumigation.		
		Number examined.	Number infected.	Percentage infection.	Number examined.	Number infected.	Percentage infection.	Number examined.	Number infected.	Percentage infection.
R. rattus	... { Veterinary Department	13,555	... 1	... 0'007	... 31	... —	... —	... —	... —	... —
	... { Public Health Department	...	...	...	... 12	... 2	... 16'67	... 430	... 1	... 0'23
	... { Port Commission	... 3,254	... 2	... 0'06	... 3	... —	... —	... 268	... —	... —
R. norvegicus	... { Veterinary Department	3,324	...	...	... 44	... 5	... 11'36	... —	... —	... —
	... { Public Health Department	...	...	...	... 24	... 2	... 8'33	... 1,189	... 8	... 0'67
	... { Port Commission	... 962	... 1	... 0'1	...	...	...	... 174	... —	... —
M. dubius	... { Veterinary Department	4	...	...	...	...	...	...	...	...
	... { Public Health Department	...	...	...	... 1	...	...	... 267	...	...
	... { Port Commission	... 708	...	...	...	...	...	... 341	...	...

Eighteen trapped Bandicoots, *Bandicota malabarica*, were negative for plague.

(d) Monthly Flea Index.

Month.	Number of Rats examined.	Flea Index.	Month.	Number of Rats examined.	Flea Index.
January	... 588	... 2'71	July	... 141	... 2'57
February	... 1,399	... 1'27	August	... 197	... 3'3
March	... 153	... 3'38	September	... 197	... 3'3
April	... 229	... 2'76	October	... 198	... 2'86
May	... 94	... 2'47	November	... 221	... 2'71
June	... 82	... 2'93	December	... 100	... 2'74

(e) Seasonal Prevalence of Rat Fleas in Endemic Plague Area, 1929.

Month.	Rats.	Fleas.	Flea Index.	Cheopis.	Astia.	Per Cent. Cheopis.	Cheopis Index.
January	... 139	... 441	... 3'2	... 125	... 316	... 28'3	... 0'9
February	... 43	... 124	... 2'9	... 30	... 94	... 24'2	... 0'7
March	... 85	... 232	... 2'7	... 75	... 157	... 32'3	... 0'9
April	... 200	... 570	... 2'9	... 115	... 455	... 20'2	... 0'6
May	... 61	... 173	... 2'8	... 26	... 147	... 15'0	... 0'4
June	... 74	... 223	... 3'0	... 73	... 150	... 32'7	... 0'9
July	... 124	... 334	... 2'7	... 81	... 253	... 24'2	... 0'7
August	... 178	... 583	... 3'3	... 103	... 480	... 17'7	... 0'6
September	... 168	... 571	... 3'4	... 112	... 459	... 19'6	... 0'7
October	... 192	... 573	... 3'0	... 90	... 483	... 15'7	... 0'5
November	... 190	... 560	... 2'9	... 94	... 466	... 16'8	... 0'5
December	... 86	... 239	... 2'8	... 48	... 191	... 20'1	... 0'6
	1,540	4,623	3'0	972	3,651	21'0	0'6

2.—GENERAL.

Some of the material submitted from the Veterinary Department by the Acting Veterinary Surgeon, Mr. M. Crawford, was of exceptional interest this year.

The *Vibrio septique* of Pasteur and Joubert was isolated from a case of "black quarter" in a cow at Jampettah street for the first time in Ceylon. The characters of the strain closely corresponded to the description given in the special report No. 39 issued by the Medical Research Committee of the same organism as it occurs in war wounds.

A strain of *Pasteurella bovisseptica* Kitt was isolated from a case of hæmorrhagic septicæmia in a cow.

Studies of anthrax among goats landed in Ceylon yielded particularly interesting results. This imported strain appears to be endowed with high pathogenicity to imported goats but low infectivity to other animals. Though a large number of animals die annually of this disease at the Quarantine Station there has only been one associated human case in recent years, despite the absence of special precautions.

Two morphologically distinct types of anthrax bacillus are seen in blood films from these goats and at least two distinct types of anthrax colonies can be isolated from them. This dissociation phenomenon is analogous to that described by Arkwright and numerous subsequent observers as occurring in enteric, plague, salmonella, pneumococci, and other bacteria, and seems to be particularly striking in the case of *B. anthracis*. The two types of culture differ so much in appearance that they might well be thought to belong to different species. It appears that this is not the first time dissociation of *B. anthracis* has been observed. Nungester has distinguished no less than seven colony types.

These variations are of great practical importance since they are correlated with great differences in degree of virulence and other properties. It is possible, in fact probable, that unrecognized dissociation may account for many anomalies in vaccine therapy and that the recognition and use of the variety of greatest immunizing power in preparing vaccines may lead to a great increase in their all round efficiency. This is a matter of great economic importance to stock raising countries much afflicted with anthrax such as South Africa. It is not uncommon for a particular batch of anthrax vaccine to show a hitherto inexplicable falling off in power to protect valuable herds against this deadly disease.

3.—WATER SUPPLIES.

Investigations into the incidence of leptospiræ in the city water supply and bathing places in Colombo have been continued.

A water leptospira, *Leptospira biflexa*, morphologically indistinguishable from *L. ictero-hæmorrhagiae*, the organism of Weil's disease, has been cultivated by Hindle's coprozoic method from the main supply entering Elie House reservoir, laboratory tap water (off the Maligakanda main), and also from bathing places in the Beira lake, Kelani river, San Sebastian canal, and the lagoon in Pasbatal road.

Attempts to exalt the virulence of these strains of leptospira by successive passage through white mice and guinea pigs have given negative results.

The significance of these observations lies in the fact that seemingly harmless leptospiræ have occasionally been known to develop pathogenic powers to both men and animals and that leptospirosis is a common cause of dengue-like fevers in Malaya, and that these leptospiræ are believed to be water-borne.

The investigations into the amoebæ of the monkeys of Labugama watershed have been continued. Actively motile amœbæ and cysts microscopically indistinguishable from *Entamoeba histolytica*, the amœba producing amœbic dysentery in man, were found in macaques. Definite evidence of the pathogenicity of these simian amœbæ to man is still lacking. Two attempts to infest kittens with *E. histolytica* from Ceylon macaques gave negative results. In view of this somewhat disquieting discovery the filtration plant was run continuously with a small dose of alum plus the necessary amount of alkali in the form of sodium carbonate, in order to further improve efficiency of filtration and eliminate active amœbæ and their cysts from the supply.

Attention is drawn to the recommendations concluding last year's research report on the Colombo water supply, particularly that relating to chlorination.

4.—HOOKWORM DISEASE.

Observations on the survival of hookworm eggs in glazed shallow sludge pans at Angoda Asylum sewage works have been carried out this year and will be set forth in a separate report. These pans serve the dual purpose of drying the sludge and raising its temperature, thereby accelerating the death-rate of hookworm ova.

In practice a range of sludge temperatures rapidly lethal to hookworm ova was only obtained under particularly favourable climatic conditions, a hot sun and a clear sky, on the other hand during wet cloudy weather the alternative advantage of protection from rain and uninterrupted drying of the sludge comes into play.

5.—PNEUMONIA.

Some experimental work was carried out with a series of types of pneumococci and anti-pneumococci sera as a preliminary to an intensive study of the Colombo pneumonias when opportunity affords.

6.—FUMIGATION OF GRAIN.

Three series of experiments were carried out on the use of hydrocyanic acid gas for the fumigation of flea-infested grain. This work was done under a special grant from the Legislative Council in co-operation with the staff of the Harbour Engineer's Department and with assistance from the Government Analyst.

The results have been embodied in a comprehensive report which it is hoped will be published during the current year. This report not only deals with fumigation technique but also discusses the various links in the chain of plague infection between Eastern ports.

A laboratory series of experiments showed that rat-fleas tend to burrow into a mass of grain to escape from a slowly rising concentration of hydrocyanic acid gas passed over the surface. A few fleas attained a depth of six inches.

Further experiments on the disinfestation of flea holding rice bags in lighters with the Liston cyanide generator showed that if the grain bags were loaded on to a raised timber grid at the bottom of the lighter and free diffusion of gas permitted at the sides the fumigation time required for effective flea killing penetration could be reduced to about one hour.

A series of experiments were carried out on the penetration of HCN gas in varying concentrations and exposure times into three varieties of rice and seven kinds of dahl, gram, beans, and pulse in sacks as ordinarily marketed. The absorption of hydrocyanic acid gas by these materials was also studied.

It was found out that when concentrations of the order of two ounces of HCN per 1,000 cubic feet of air were used fleas and their eggs and larvæ could be killed when placed in gauze cages in the centre of the rice bags and the larger size of other grains in about 40 minutes. With higher concentrations the exposure time could be reduced to as low as 20 minutes. The main object of these experiments was to obtain data for the design of a fumigating conveyor which would enable grain to be disinfested in a current of cyanide gas whilst in transit between lighter and granary, thus obviating any interruption in the rate of unloading of the immense quantities of grain imported. It is believed that penetration of HCN to a depth of six inches into the sacks in a concentration adequate definitely to turn a sensitive cyanide test paper would suffice for practical plague preventive purposes, and that this result could be obtained in a hooded conveyor with revolving gas traps at each end if the sacks of grain were passed through a current of air containing two ounces of HCN per 1,000 cubic feet for 30 minutes.

The selection of the method to be adopted for grain fumigation on the very large scale required in Colombo Harbour must be primarily governed by economic considerations. If the flow of grain bags can be stayed for one hour and a half at jetties specially equipped for simultaneous fumigation of a number of lighters, then the lighter solution of the problem is feasible.

On the other hand if it is proposed to proceed with the scheme for the complete mechanization of rice deliveries, then a fumigating conveyor could be installed somewhere in the circuit between the lighter and the Chalmers granaries. The empty lighter would also require fumigation for the destruction of rats, but this is a simple operation which would not interfere with the grain traffic.

Fumigation in a mechanical conveyor has the advantage in ease of operation and supervision, and cost of fumigant used. Each bag would be fully exposed to the gas and part of the subsequent ventilation could be made automatic. The initial cost of the apparatus would, however, be high, though not in proportion to the magnitude of the task to be performed.

7.—RAT-FLEA SURVEYS.

(i.) Colombo.

Reference was made in the report for 1928 to the second comprehensive rat-flea survey of Colombo begun in January, 1928, and completed in February, 1929.

For purposes of comparison the general results are scheduled below those of the 1922 to 1924 survey in Tables (f) and (g).

It will be noted that no great change has taken place as judged by species percentage or cheopis index. The disquieting feature of the new results is the appearance of *X. cheopis* on the rats in a number of premises of a district, such as Kotahena Central, formerly entirely free from this efficient plague-carrier.

(ii.) Grain Ships in Harbour.

Table (h) exhibits the general results of the rat and rat-flea survey of grain ships entering Colombo Harbour for the year October 1, 1928, to September 30, 1929. The traps were set by the staff of Port Commission.

The results are of considerable interest as showing the uniformly high percentage of *X. cheopis* found on both *R. rattus* and *R. norvegicus*. This finding is in accordance with other published identifications of rat-fleas on board shipping engaged on tropical and sub-tropical routes. It strengthens the importance of the ship as a link in the chain of plague infection between an export grain store overseas and an import one in Colombo. The remarkably high proportion of *R. norvegicus* is noteworthy. At American stations *R. rattus* greatly preponderates on shipboard.

(iii.) Flea-Survey of Ceylon.

Preliminary rat-flea surveys have been undertaken by the staff of the Sanitation Branch of the Government Medical Service in a number of centres.

The flea catching gang was trained at this laboratory and the fleas sent here for identification. The main results to date are shown below :—

Low-Country Results.

		No. of Fleas.	<i>X. astia</i> index.
Galle	Commercial premises	1,207	6.1
	Residential premises	821	3.3
Kalutara	Commercial premises	556	3.3
	Residential premises	1,040	2.6
Beruwala	Mainly commercial	197	3.0

Galle showed a pure *X. astia* rat-flea population. Attention is drawn to the abnormally high *X. astia* index in commercial premises. This survey was carried out in the course of a mild sporadic outbreak of plague apparently traceable to importation through the harbour front.

It is somewhat remarkable that no *X. cheopis* were found among the 87 fleas identified from the Galle Customs premises.

One specimen of *Xenopsylla cheopis* was found in the Kalutara District on a rat from a boutique kept by a dealer who possessed similar premises in Fifth Cross street, Pettah, Colombo, heavily infested with *X. cheopis* and who constantly imported goods into the Kalutara boutique from this source.

Considering the constant commercial intercourse between the coastal towns and Colombo it is remarkable that more instances of this description have not been discovered.

It would appear that the low-country wet zone as a whole is an *astia* area which has so far successfully resisted penetration by *X. cheopis*, a species of rat-flea undoubtedly associated in Colombo with wholesale imports from *cheopis* infested territories overseas.

Quite a different condition is met with up-country as is shown by the gross percentage results of local flea surveys scheduled below :—

Up-Country Results.

Crude Percentage Proportions of Species,

	Kandy District	Galaha-Deltota District	Ragala.	Nuwara Eliya.
	1928 1,600 feet. 1,463 fleas.	1929 3,000 feet. 56 fleas.	1929 5,000 feet. 213 fleas.	1929 6,000 feet. 83 fleas.
<i>Xenopsylla cheopis</i>	69.6	58.9	51.6	14.5
<i>Xenopsylla astia</i>	30.4	23.2	0.5	nil.
<i>Ceratophyllus tamilanus</i>	nil.	nil.	5.2	38.5
<i>Leptopsylla segnis</i>	nil.	1.8	36.6	32.6
<i>Stivalius phoberus</i>	nil.	nil.	6.1	12.0
<i>Ctenocephalus felis felis</i>	nil.	nil.	nil.	2.4
<i>Echidnophaga gallinacea</i>	nil.	16.1	nil.	nil.

No less than four foreign species of flea occur in up-country rats, viz., *Xenopsylla cheopis* (Indo-Africa), *Leptopsylla segnis* (European mouse-flea), *Ctenocephalus felis*, (European cat-flea), and *Echidnophaga gallinacea*, a flea now widely spread wherever domestic fowls have been introduced.

The indigenous fleas of up-country field rodents are probably *Ceratophyllus tamilanus* and *Stivalius phoberus*, the others may be regarded as comparatively recent introductions into what must, before the opening up of communications, have been virgin territory for domestic rats.

In the last annual report the writer ventured to predict that *X. astia* would be found to be comparatively scarce at elevations over 4,000 feet. It will be noted on inspection of the results for Ragala and Nuwara Eliya that this prediction has already been borne out. The conditions

become relatively unfavourable for *X. cheopis* at the 6,000 feet elevation. Judging from epidemiological evidence collected on a world-wide basis the belt of hill territory in the Central Province lying between 2,000 and 4,000 feet elevation presents climatic conditions more favourable to endemicity of plague than are to be found in any other part of Ceylon, and it is significant that *X. cheopis* seems to be more abundant on the rats of this region than anywhere else so far surveyed.

L. F. HIRST.

City Microbiologist.

January 28, 1930.

(f) *Flea Survey of Colombo, 1920-24.*

	DISTRICT.	Total Fleas identified, 1920-24.	No. of <i>X. cheopis</i> .	Per Cent. <i>X. cheopis</i> .	Pure Takes <i>R. rattus</i> .	Flea Index.	<i>X. cheopis</i> Index.	Rats caught per 100 Traps laid.	<i>X. cheopis</i> per 100 Traps laid.	Population, 1921 Census.	Human cases of Plague Nov, 1920—Feb, 1924.	Human Plague Incidence per 10,000 of Population.
1	Pettah ...	965	276	28.60	195	2.9	0.83	14.5	11.75	7,601	98	128.9
2	St. Paul's ...	939	131	13.95	170	3.0	0.42	15.4	6.47	19,954	166	83.6
3	Markets ...	669	54	8.07	113	2.1	0.17	19.4	3.30	14,027	68	48.5
4	Slave Island ...	846	49	5.79	168	2.7	0.16	20.8	3.55	21,564	99	45.9
5	San Sebastian ...	798	46	5.76	82	2.8	0.16	18.6	2.98	11,492	52	45.2
6	Maradana ...	883	16	1.81	144	1.9	0.03	22.9	0.69	45,571	56	12.2
7	Kollupitiya ...	2,149	31	1.44	200	1.9	0.03	18.5	0.55	50,391	31	6.1
8	New Bazaar ...	1,487	15	1.00	158	2.4	0.02	17.6	0.35	36,240	74	20.4
9	Kotahena ...	838	4	0.48	171	2.1	0.01	18.7	0.19	34,643	6	1.7

(g) *Flea Survey of Colombo, 1928-29.*

	DISTRICT.	Total No. of Fleas.	Total No. of <i>X. astia</i> .	Total No. of <i>X. cheopis</i> .	Per Cent. <i>X. cheopis</i> .	Per Cent. <i>X. astia</i> .	No. of Rats examined for Fleas.	Total Flea Index.	<i>X. astia</i> Index.	<i>X. cheopis</i> Index.	No. of Flea- infested Premises.	No. of <i>X. cheopis</i> Infested Premises
1	Pettah ...	3,023	2,215	808	26.7	73.30	943	3.2	2.3	0.9	161	102
2	St. Paul's ...	2,007	1,599	408	20.4	79.6	758	2.6	2.1	0.5	149	86
3	Markets ...	941	908	33	3.5	96.5	355	2.6	2.56	0.09	76	14
4	Slave Island ...	1,154	1,128	26	2.2	97.8	493	2.34	2.29	0.05	78	6
5	San Sebastian ...	564	543	21	3.7	96.3	277	2.04	1.96	0.08	40	9
6	Maradana ...	928	917	11	1.2	98.82	501	1.85	1.83	0.02	74	6
7	Kollupitiya ...	2,577	2,541	36	1.4	98.6	1,140	2.26	2.23	0.03	197	8
8	New Bazaar ...	641	623	18	2.8	97.2	299	2.14	2.08	0.06	69	7
9	Kotahena ...	1,444	1,403	41	2.8	97.2	760	1.72	1.71	0.01	148	14
10	Fort ...	450	391	59	13.1	82.9	157	2.9	2.5	0.4	37	10
11	Government Granaries ...	184	76	108	58.7	41.3	95	1.9	0.8	1.1	—	—
12	H. M. Customs ...	1,524	657	867	56.8	43.1	372	4.09	1.8	2.3	—	—
13	Municipal Granaries ...	51	33	18	35.3	64.7	54	0.94	0.33	0.61	—	—

The survey of the city began January 1, 1928, and was completed on February 23, 1929. The survey of H. M. Customs premises, Government and Municipal granaries extended over the period January 1, 1928, to June 30, 1929.

(h) *Rat-Flea Survey of Grain Ships in Colombo Harbour.—October 1, 1928–September 30, 1929.*

		Rattus rattus.														
Source of Cargo.		No. of Ships trapped,	No. of Ships yielding <i>R. rattus</i> .		No. of <i>R. rattus</i> searched.		No. of Fleas found.		No. of <i>X. astia</i> .		No. of <i>X. cheopis</i> .		Per Cent. <i>X. cheopis</i> .	<i>Cheopis</i> Index.		
Rangoon	...	87	...	29	...	108	...	296	...	14	...	282	...	95.27	...	2.61
Bombay	...	22	...	11	...	12	...	16	...	4	...	12	...	75.00	...	1.00
Calcutta	...	17	...	5	...	48	...	86	...	1	...	85	...	98.84	...	1.77
Singapore	...	7	...	1	...	2	...	37	...	—	...	37	...	100.00	...	—
		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>
Total	...	133		46		170		435		19		416		95.63		2.45
		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>

		Rattus norvegicus.														
		No. of Ships yielding <i>R. norvegicus</i> .		No. of <i>R. norvegicus</i> searched.		No. of Fleas found.		No. of <i>X. astia</i> .		No. of <i>X. cheopis</i> .		Per Cent. <i>X. cheopis</i> .	<i>Cheopis</i> Index.			
Rangoon	...	87	...	74	...	353	...	679	...	46	...	633	...	93.24	...	1.79
Bombay	...	22	...	13	...	116	...	467	...	3	...	464	...	99.4	...	4.02
Calcutta	...	17	...	17	...	66	...	127	...	17	...	110	...	86.61	...	1.66
Singapore	...	7	...	6	...	32	...	35	...	—	...	35	...	100.00	...	1.09
		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>
Total	...	133		110		567		1,308		66		1,242		94.95		2.18
		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>		<hr/>

Annexure B.

REPORT OF THE CITY ANALYST FOR 1929.

During the year 1929 a grand total of 1,543 samples were examined, of which 1,271 samples were milks, 192 samples town waters, 10 samples well waters, and 70 samples miscellaneous.

The city water supply maintained its high standard of purity throughout the year as far as could be ascertained by analyses. Dr. Hirst, the City Microbiologist, has written up all the experimental work carried out on the City water supply, chemical and bacteriological, for several years past. In view of the advances in science relative to water supplies, it is considered necessary to further purify the city water supply now that all the evidence collected has been carefully considered. Bacteriological results give rise to the suspicion that the purity of the water is not all that could be desired; blame being mainly placed on a genus of monkey frequenting the collecting area possessing the power of carrying disease communicable to man *via* water. There is also the old trouble from incrustation of pipes. To overcome these difficulties, it is suggested to precipitate alum in the settling basin and then pass the unsettled floc on to the surface of the sand of the Jewel gravity filters, and to chlorinate the filtered water in the clear water basin. The addition of alum to the raw water would necessitate a larger settling basin to relieve the filters and prevent them clogging up too quickly with the alum floc.

In the experimental work, acid alum (ferric-alumina) and basic alum (sodium aluminate) gave the quickest and best floc, acid alum and soda ash (magadi) the second best, while acid alum and burnt lime gave the third.

A system of aeration by spraying over coral, followed by coke, is suggested as pre-filtration treatment, in order to aerate the water and reduce the amount of coagulant required and consequent relief of the filters. The aeration and use of alum floc would give a clear water, free from incrustation properties.

Chlorination of the water in the clear filtered water basin would be effective in giving to the city a sterile water supply above suspicion.

The rough straining carried out by the Jewel filters, as they are used at present, only removes coarse plankton with bacteria enmeshed. The whole economic and hygienic value of the filters is not utilized and will not be until alum floc is used.

The settling tank is too small to be effective in removing plankton or alum floc, so that the sediments natural or artificial pass on to the filters, choking them and enforcing repeated washings. It would be more economical to have a larger settling basin to reduce the precipitate by sedimentation than to increase the number of filters with their cost of working and upkeep. Choking of the filters is more pronounced after heavy rains when plankton is high and the use of alum floc is more necessary.

Ten samples of well waters were examined. Of these, nine were returned as unfit for human consumption and one sample as suspicious. Intermittent contamination is the great source of danger in well waters. Samples passed as fit for human consumption should be retested if the collecting area is at all suspicious.

Nine Kelani river water samples were collected and tested for dissolved oxygen. In none of the samples collected was dissolved oxygen found to differ from various parts of the river above and below the sewage outfall. The river, as it absorbs the sewage effluent, is not denuded of its purifying power, and the river is considered able to carry the sewage effluent at its present strength without harm to the river or its surroundings. This is not to say that the river water is fit for human consumption. If the septic tanks were covered over and the collected gas drawn off and burnt, the sewage system could probably be carried out without discomfort to the surrounding population.

Three Wellawatta canal samples were tested; it could not be said that the canal was impregnated with sewage matter to any extent.

The ela at Kolonnawa was found to be impregnated with vegetable matter, but not with sewage.

1,271 samples of milk were tested. 724 samples were passed=57.0 per cent.; this compares with 60.7 per cent. for 1928. The decrease of passes, although small (3 per cent.), is noticeable. There is no periodicity of passes. June was a bad month, 44.4 per cent. of passes. April (66.9 per cent.) and October (66 per cent.) were above the average for passes.

There were 2 per cent. more milks which fell under the 1-10 per cent. (added water) below standard compared with 1928. A total of 335 or 26.4 per cent. were below standard, 1-10 per cent. for 1929. March 36.6 per cent. and June 37.9 per cent. were the highest months, May and October 20.3 per cent. were the lowest months.

The 11-30 per cent. added water samples amounted to 131=10.3 per cent., the same as 1928. January 14.2 per cent. and May 15.7 per cent. of samples were the highest months. There was an improvement during October-December (6.7 per cent. to 7.6 per cent.).

Adulteration by added water over 31 per cent. totalled 81=6.3 per cent. compared with 4.9 per cent. in 1928. April 3=2.9 per cent. and September 4=3.6 per cent. were the lowest months. May 13=12 per cent. was the highest month.

The maximum adulteration 74 per cent. occurred in February and December.

A comparative statement for the five years is interesting.

Year.		Unadulterated. Per Cent.		Added Water.			
				1-10 Per Cent.		11-30 Per Cent.	+ 31 Per Cent.
1925	...	66.3	...	20.4	...	8.1	5.1
1926	...	64.8	...	23.6	...	7.1	4.4
1927	...	63.6	...	26.1	...	6.4	3.9
1928	...	60.7	...	24.1	...	10.3	4.9
1929	...	57.0	...	26.4	...	10.3	6.3

The above table indicates that Colombo milk supply is slowly deteriorating. Such a state of affairs calls for more stringent regulations and enhanced fines, especially for the higher adulterations. In the United Kingdom, fines for milk adulteration are sufficiently high to deter milk vendors from adulterating the milk supply. In Colombo, the milk vendors flaunt the law and continue to adulterate as it pays them to do so. Adulteration should be made uneconomic. Higher adulteration, such as found in Colombo, would not be tolerated in the United Kingdom.

Cream removed or fat deficiency is considered a serious crime in the United Kingdom. Due to the mixing of cows' and buffaloes' milk with water and selling as one or the other, it is difficult for the Analyst to state whether cream has been removed, especially on cow milk standard. The following figures were obtained on samples received. See table below, "deficient in fat."

From the table "deficient in fat," it will be seen that 345 samples=27.1 per cent. were below the standard, whatever the class the milk vendor declared. The month of May was the worst with 38 per cent. of the samples examined found below the standard. 100=7.9 per cent. samples were found with a fat deficiency of 1-10 per cent. below the standard, 166=13 per cent. had 11-30 per cent. fat deficiency, and 79=6.2 per cent. of samples had over 31 per cent. fat removed. The maximum fat deficiency was 95.7 per cent.

The fat is the most important constituent of milk especially for the young, as it contains the fat soluble vitamins A, D, and E which are essential for growth and prevention of rickets.

A comparison of the added water and the fat deficiency is interesting—

<i>Added Water.</i>						
Total		1-10		11-30		+ 31
added Water.		Per Cent.		Per Cent.		Per Cent.
43'0 per cent.	...	26'4	...	10'3	...	6'3
<i>Fat Deficiency.</i>						
Up to		1-10		11-30		+ 31
Fat Standard.		Per Cent.		Per Cent.		Per Cent.
72'9 per cent.	...	7'9	...	13	...	6'2

In the higher fat deficiency, that is over 11 per cent., there are grosser deficient-in-fat figures than added water figures.

These figures denote serious food deficiencies for the young in the milk supply, and the facts would be much worse if all the milk consumed could be tested.

On a few occasions, cane sugar has been found in milk samples. Cane sugar would come under "other foreign matter" and is considered an adulterant.

Cane sugar is added to milks in the form of sweetened condensed milk or more usually as jaggery which gives the milk a rich creamy appearance.

Four samples of condensed milk were tested. One brand in particular is at fault as it contains boracic acid, and the retailers defy laws of elsewhere by continuing to sell the milk as there is no law in Colombo to prevent them. The dilution figures for imported milk were also ignored by the same retailers. This has now been rectified, but the dilution figures required should be declared for every sale, however small, when the purchase takes place from a portion of a large container. Law compels the dilution to be printed on every tin sold.

Government has taken no steps to prevent Colombo being made the dumping ground of the cast-offs from other countries.

By the addition of the word "food" to dried milk products, imported under registered names, large consignments of such come into Colombo and are sold without the correct dilution figures being declared as for imported milks. Some of the milk foods are made from partially skimmed milk, and yet the fat is the most important feeding factor in milk.

Laws should be made that will not favour the importer, otherwise the laws made for local milk vendors are an oppression.

Nine samples of arrack were tested for copper. There is a great improvement in the copper content of arrack ; only on one or two occasions has the copper content of arrack slightly exceeded the Government standard of 0·25 grains per gallon. There has been a continual complaint for twenty-five years against the high copper content of arrack, and it is some satisfaction to find that an arrack with a low copper content has now been issued to Colombo consumers.

No comments are necessary on the other samples examined.

The Laboratory, Turret road south,
Colombo, February 19, 1930.

ALEXANDER BRUCE,
City Analyst.

Sample Index.											
Months.	Town Water.		Well Water.		Miscellaneous.				Milk.		
January	...	16	...	1	...	1 block tin filing, 2 filings of solder of tin pipes .				105	
February	...	16	...	—	...	3 canal waters, 5 filings iron solder pipes, 1 arrack, 4 sewages, 4 Kelani river waters				...	
March	...	16	...	—	...	1 arrack, 5 Kelani river waters...				...	
April	...	16	...	2	...	1 arrack ...				...
May	...	16	...	3	...	2 aerated waters, 2 sewages, 1 arrack				...	
June	...	16	...	—	...	2 ice-creams, 1 arrack, 1 soda water, 1 coffee				...	
July	...	16	...	—	...	4 sewages, 4 manures, 1 arrack, 3 condensed milk.				...	
August	...	16	...	2	...	1 arrack ...				...
September	...	16	...	1	...	4 sewages, 1 arrack, 1 buffalo liver				...	
October	...	16	...	—	...	—				...	
November	...	16	...	—	...	1 arrack, 1 flour, 1 condensed milk				...	
December	...	16	...	1	...	1 ela water, 3 teas, 1 arrack, 1 ghee, 5 sewages				...	
Total	...	192		10		70					1,271
Grand Total ...										1,543	

Well Water, 1929.

Months.	Well Waters.		Pass.		Condemned.		Suspicious.	
January	...	1	...	—	...	1	...	—
February	...	—	...	—	...	—	...	—
March	...	—	...	—	...	—	...	—
April	...	2	...	—	...	1	...	1
May	...	3	...	—	...	3	...	—
June	...	—	...	—	...	—	...	—
July	...	—	...	—	...	—	...	—
August	...	2	...	—	...	2	...	—
September	...	1	...	—	...	1	...	—
October	...	—	...	—	...	—	...	—
November	...	—	...	—	...	—	...	—
December	...	1	...	—	...	1	...	—
Total	...	10	...	—	...	9	...	1
Grand Total	...	10						

Fat Deficiency—Milk as sold, 1929.

Months.	Total Milks.			Total below Standard.		1-10 Per Cent.		11-30 Per Cent.		+ 31 Per Cent.		Maximum.	
January	...	105	...	30=28·6	per cent.	...	12	...	12	...	6	...	48·6 per cent.
February	...	105	...	27=25·7	per cent.	...	8	...	15	...	4	...	60·0 per cent.
March	...	109	...	28=25·7	per cent.	...	8	...	11	...	9	...	51·4 per cent.
April	...	103	...	23=22·3	per cent.	...	5	...	17	...	1	...	45·8 per cent.
May	...	108	...	41=38	per cent.	...	10	...	19	...	12	...	95·7 per cent.
June	...	108	...	28=25·9	per cent.	...	8	...	16	...	4	...	39·9 per cent.
July	...	104	...	34=32·7	per cent.	...	8	...	20	...	6	...	72·8 per cent.
August	...	108	...	36=33·3	per cent.	...	13	...	14	...	9	...	61·4 per cent.
September	...	110	...	31=28·2	per cent.	...	10	...	13	...	8	...	71·4 per cent.
October	...	103	...	24=23·3	per cent.	...	4	...	13	...	7	...	65·7 per cent.
November	...	103	...	25=24·3	per cent.	...	11	...	8	...	6	...	47·1 per cent.
December	...	105	...	18=17·1	per cent.	...	3	...	8	...	7	...	74·3 per cent.
Total 1929	...	1,271	...	345=27·1	per cent.	...	100=7·9 %		166=13 %		79=6·2 %		95·7 per cent.
1928	...	1,237	...	18·35	per cent.	...	5·82 %		10·2 %		2·3 %		62·8 per cent.

MILK ANALYSES.

Added Water 1929.

Months.	Total Number of Samples examined.		0 Per Cent.	1-10 Per Cent.	11-30 Per Cent.	+ 31 Per Cent.	Maximum.				
January	...	105	{ No. of samples 55	...	30	...	15	...	5	...	} 62 per cent.
			{ Per cent. of samples 52'3	...	28'5	...	14'2	...	4'7	...	
February	...	105	{ No. of samples 59	...	26	...	12	...	8	...	} 74 per cent.
			{ Per cent. of samples 56'2	...	24'7	...	11'4	...	7'6	...	
March	...	109	{ No. of samples 54	...	40	...	10	...	5	...	} 57 per cent.
			{ Per cent. of samples 49'5	...	36'6	...	9'1	...	4'5	...	
April	...	103	{ No. of samples 69	...	23	...	8	...	3	...	} 59 per cent.
			{ Per cent. of samples 66'9	...	22'3	...	7'8	...	2'9	...	
May	...	108	{ No. of samples 56	...	22	...	17	...	13	...	} 62 per cent.
			{ Per cent. of samples 51'8	...	20'3	...	15'7	...	12'0	...	
June	...	108	{ No. of samples 48	...	41	...	12	...	7	...	} 54 per cent.
			{ Per cent. of samples 44'4	...	37'9	...	11'1	...	6'4	...	
July	...	104	{ No. of samples 57	...	30	...	10	...	7	...	} 67 per cent.
			{ Per cent. of samples 54'8	...	28'8	...	9'6	...	6'7	...	
August	...	108	{ No. of samples 65	...	24	...	11	...	8	...	} 68 per cent.
			{ Per cent. of samples 60'1	...	22'2	...	10'1	...	7'4	...	
September	...	110	{ No. of samples 65	...	28	...	13	...	4	...	} 61 per cent.
			{ Per cent. of samples 59'0	...	25'4	...	11'8	...	3'6	...	
October	...	103	{ No. of samples 68	...	21	...	7	...	7	...	} 68 per cent.
			{ Per cent. of samples 66'0	...	20'3	...	6'7	...	6'7	...	
November	...	103	{ No. of samples 62	...	26	...	8	...	7	...	} 52 per cent.
			{ Per cent. of samples 60'1	...	25'2	...	7'7	...	6'7	...	
December	...	105	{ No. of samples 66	...	24	...	8	...	7	...	} 74 per cent.
			{ Per cent. of samples 62'8	...	22'8	...	7'6	...	6'6	...	
Total 1929	...	1,271	{ No. of samples 724	...	335	...	131	...	81	...	} 74 per cent.
			{ Per cent. of samples 57'0	...	26'4	...	10'3	...	6'3	...	
1928	...	1,237	Per cent. of samples 60'7	...	24'1	...	10'3	...	4'85	...	77 per cent.

